

Chapter ILHR 81

APPRENTICESHIPS, LICENSURES, REGISTRATIONS AND CERTIFICATIONS

Subchapter I — Apprenticeships, Licensures and Registrations	ILHR 81.302 Scope (p. 23)	
ILHR 81.001 Purpose (p. 1)	ILHR 81.304 Certification processing times (p. 23)	
ILHR 81.002 Scope (p. 1)	ILHR 81.31 Definitions (p. 23)	
ILHR 81.004 Permit processing times (p. 2)	ILHR 81.32 Administration and enforcement (p. 25)	
ILHR 81.01 Definitions (p. 2)	ILHR 81.33 Authority (p. 25)	
ILHR 81.02 Plumbing apprenticeship (p. 3)	ILHR 81.34 Inspector certification (p. 26)	
ILHR 81.03 Registered learners (p. 6)	ILHR 81.35 Independent inspection agency certification — in-plant inspections (p. 28)	
ILHR 81.04 Qualifications for licensure examinations (p. 8)	ILHR 81.36 Independent inspection agency certification — on-site inspections (p. 30)	
ILHR 81.05 Plumbing licensure examinations (p. 8)	ILHR 81.37 Suspension or revocation of certification (p. 31)	
ILHR 81.06 Temporary permits (p. 10)	ILHR 81.38 Certification fees (p. 33)	
ILHR 81.07 Exchange of licenses without examination (p. 10)	ILHR 81.39 Petition for rules or declaratory rulings (p. 33)	
ILHR 81.08 Plumber licensure-retiree (p. 11)	ILHR 81.40 Private sewage system inspections (p. 33)	
ILHR 81.09 Utility contractor license and registration of pipe layers (p. 11)	Subchapter III — Certification of Soil Testers	
ILHR 81.10 Licensing of automatic fire sprinkler fitters and contractors (p. 12)	ILHR 81.601 Scope (p. 33)	
ILHR 81.11 Registration for the maintenance of automatic fire sprinklers (p. 15)	ILHR 81.603 Certification processing times (p. 31)	
ILHR 81.12 Expiration of licenses and registrations (p. 17)	ILHR 81.61 Definitions (p. 34)	
ILHR 81.13 License and registration renewal (p. 18)	ILHR 81.62 Reports (p. 34)	
ILHR 81.14 Suspension and revocation of licenses (p. 19)	ILHR 81.63 Examining committee (p. 34)	
ILHR 81.15 Suspension and cancellation of registrations (p. 20)	ILHR 81.64 Application and examination (p. 35)	
ILHR 81.16 Examination, licensure and registration fees (p. 20-f)	ILHR 81.65 Issuance of certificate (p. 36)	
Subchapter II — Certification of Plumbing Inspectors	ILHR 81.66 Renewal of certificate; delinquency and reinstatement (p. 36)	
ILHR 81.301 Purpose (p. 23)	ILHR 81.67 Revocation or suspension of certificate (p. 36)	

Note: Chapters II 61 and 64 as they existed on April 30, 1983 were repealed and a new chapter ILHR 81 was created effective May 1, 1983.

Subchapter I — Apprenticeships, Licensures and Registrations

ILHR 81.001 Purpose. The purpose of this subchapter is to protect the health of the public by establishing minimum standards as to the qualification, activities and responsibilities of persons engaging or offering to engage in plumbing work or the installation of automatic fire sprinkler systems.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

ILHR 81.002 Scope. The provisions of this subchapter apply to any person engaging or offering to engage in the construction, installation or maintenance of plumbing or automatic fire sprinkler systems.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

Register, May, 1988, No. 389

ILHR 81

ILHR 81.004 Permit processing times. Licenses, permits and registrations issued under this subchapter shall be granted or denied by the department within 30 business days after passage of examination or receipt of the applicable application and fees.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85.

ILHR 81.01 Definitions. For the purpose of this subchapter, the following terms are defined:

- (1) "Approved" means acceptable to the department.
- (2) "Automatic fire sprinkler contractor" means an individual, firm or corporation as defined in s. 145.01 (9), Stats.
- (3) "Automatic fire sprinkler fitter" means a person as defined in s. 145.01 (10), Stats.
- (4) "Automatic fire sprinkler system" means an installation as defined in s. 145.01 (8), Stats.
- (5) "Automatic fire sprinkler system apprentice" means a person as defined in s. 145.01 (11), Stats.
- (6) "Business establishment" means any industrial or commercial organization or enterprise operated for profit, including but not limited to a proprietorship, partnership, firm, business trust, joint venture, syndicate, corporation or association.
- (7) "Department" means the bureau of plumbing within the department of industry, labor and human relations.
- (8) "Gross negligence" means a high degree of failure to exercise ordinary care or judgement and failure by omission or commission to discharge the duty required to protect the public health, safety and welfare.
- (9) "Incompetence" means conduct which evidences a lack of competence or ability to discharge the duty required to protect the health, safety and welfare of the public, lack of knowledge of the fundamental principles of plumbing or an inability to apply those principles, or failure to maintain competency in the current practices and methods applicable to plumbing and the state uniform plumbing code.
- (10) "Journeyman plumber" means a person as defined in s. 145.01 (3), Stats.
- (11) "Master plumber" means a person as defined in s. 145.01 (2), Stats.
- (11m) "Master plumber in charge" means a master plumber who assumes the responsibility for the installation of plumbing and training of apprentices and registered learners in accordance with ch. 145, Stats., and chs. ILHR 81 to 86.

(12) "Misconduct" means an act performed in the discharge of enforcement duties which jeopardizes the interests of the public, including violation of federal or state laws, local ordinances or administrative rules relating to the position; preparation of deficient or falsified reports; failure to submit information or reports required by law or contract when requested by the municipality or the department; conduct which evidences a lack of trustworthiness; misrepresentation of qualifications such

as education, experience or certification; illegal entry of premises; misuse of funds; or misrepresentation of authority.

(13) "Pipe layer" means a person as defined in s. 145.01 (13), Stats.

(14) "Plumbing" means an installation as defined in s. 145.01 (1), Stats.

(15) "Plumbing apprentice" means a person as defined in s. 145.01 (4), Stats.

(16) "Registered learner" means a person as defined in s. 145.01 (7), Stats.

(17) "Restricted plumber licensee" means a person as defined in s. 145.01 (6), Stats.

(17m) "Secretary" means the secretary of the department of industry, labor and human relations.

(18) "Utility contractor" means a person as defined in s. 145.01 (12), Stats.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83; cr. (11m) and (17m), Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 81.02 Plumbing apprenticeship. (1) QUALIFICATIONS FOR REGISTRATION. All applicants for registration as plumbing apprentices shall have reached the age of 16 years and shall have completed the 12th grade in school or its equivalent.

(2) **REGISTRATION.** Every plumbing apprentice shall register with the department immediately. Registration forms shall be furnished by the department which shall require the applicants to indicate their name, age, preliminary schooling, beginning date of indenture, name and address of employer and such other information as the department may require. Persons beginning an accredited plumbing trade school approved by the department may also register.

(3) **RESPONSIBILITY OF EMPLOYER.** (a) Registration as a plumbing apprentice may not be accepted unless the particular organization in which the apprentice is to work is equipped to have an apprentice. The master plumber in charge shall see that the requirements as to both practical and school training are complied with in accordance with subs. (5) and (6). The master plumber in charge shall report to the department any changes made in relation to the continued employment of an apprentice. All changes in relation to the continued employment of plumbing apprentices shall be subject to the joint approval of the divisions of the department of industry, labor and human relations having jurisdiction.

(b) Master plumbers employing plumbing apprentices shall be owners or co-owners with a monetary interest in a firm or corporation engaged in the installation of plumbing. Master plumbers in the employ of state agencies shall be considered employing master plumbers for the purpose of this section. Master plumbers shall be licensed by this state.

(4) **SUSPENSION OF REGISTRATION.** (a) Whenever a plumbing apprenticeship ceases to exist or whenever a registration is accepted under such conditions as would not warrant an acceptance if the facts are presented, or when there is willful noncompliance with the shop and school training

requirements, the department shall suspend such registration until the conditions are remedied or shall cancel such registration, if necessary.

(b) A registration which has lapsed either through suspension or cancellation may be renewed in the same manner as new registrations and the department may grant such credit toward completion of the 4-year apprenticeship as it may deem proper in each case.

(5) PLUMBING INSTRUCTION. A plumbing apprentice's education shall include both day school and night school instruction.

(a) *Day school instruction.* Unless a graduate of an accredited plumbing trade school approved by the department, a plumbing apprentice shall complete a minimum of 400 hours of day school in plumbing related instruction.

1. All day school courses shall be approved by the department and the state joint apprenticeship committee.

2. The 400 hours of day school shall include instruction in:

- a. The state uniform plumbing code;
- b. Related plumbing science; and
- c. Plumbing trade mathematics.

3. The 400 hours of day school instruction shall include at least 36 hours per year in each of the following:

- a. Related plumbing science; and
- b. Plumbing trade mathematics.

4. All day school courses shall include a final written competency examination.

a. Competency examinations shall be approved by the department and the state joint apprenticeship committee.

b. In order to receive the hourly credit for a day school course, a plumbing apprentice shall successfully pass the course's final competency examination.

c. In order to pass a competency examination, a grade of 75% or greater shall be obtained.

d. Failure to pass a competency examination shall necessitate the plumbing apprentice to repeat the day school course in order to receive credit for the course.

e. The results of the competency examinations shall be immediately forwarded to the apprenticeship and training division of the department of industry, labor and human relations.

Note: The mailing address for the apprenticeship and training division is:

APPRENTICESHIP AND TRAINING DIVISION
Department of Industry, Labor and Human Relations
P.O. Box 7946
Madison, WI 53707

(b) *Night school instruction.* A plumbing apprentice shall complete a minimum of 180 hours of night school instruction.

1. All night school courses shall be approved by the department and the state joint apprenticeship committee.

2. Every night school course shall include a final examination.

a. Final examinations shall be approved by the department.

b. Completion of each night school course shall be contingent upon the successful passage of the final examination.

c. The minimum passing grade for a final examination shall be established by the state joint apprenticeship committee.

d. Failure to pass a final examination shall necessitate the plumbing apprentice to repeat the night school instruction in order to receive credit for the course.

e. The results of the final examinations shall be immediately forwarded to the apprenticeship and training division of the department of industry, labor and human relations.

Note: The mailing address for the apprenticeship and training division is:

APPRENTICESHIP AND TRAINING DIVISION
Department of Industry, Labor and Human Relations
P.O. Box 7946
Madison, Wisconsin 53707

3. The 180 hours of night school shall include instruction in:

a. Welding;

b. First aid;

c. Transit;

d. Domestic water heating;

e. Related plumbing science;

f. Blueprint reading;

g. Basic properties of water including water conditioning;

h. State uniform plumbing code; or

i. Miscellaneous subjects whose courses have been requested by the local joint apprenticeship committee and approved by the department and the state joint apprenticeship committee.

4. Every plumbing apprentice shall complete night school courses in welding, first aid and transit.

5. Credit toward the required minimum 180 hours of night school instruction shall not include more than:

a. Sixty hours of courses in welding;

b. Fifteen hours of courses in first aid; and

c. Twenty hours of courses in transit.

(6) PRACTICAL TRAINING. A plumbing apprentice shall receive practical training in all phases of plumbing.

ILHR 81

(a) *First 3 years.* During the first 3 years of apprenticeship plumbing apprentices shall be given the opportunity to install plumbing material as their skill may permit under the immediate supervision of a journeyman or master plumber licensed in Wisconsin.

(b) *Fourth year.* During the fourth year of apprenticeship plumbing apprentices may make plumbing installations as their acquired skill will permit under general supervision of a master plumber licensed in Wisconsin.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83; r. and recr. (3) (a), Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 81.03 Registered learners. (1) QUALIFICATION FOR REGISTRATION. All applicants for registration as registered learners shall have reached the age of 16 years and shall have completed the 12th grade in school or its equivalent.

(2) **REGISTRATION.** Pursuant to s. 145.07 (7) (a), Stats., every plumbing learner shall register with the department. Registration forms shall be furnished by the department which shall require the applicants to indicate their name, age, schooling, beginning date of employment, name and address of employer, work classification and such other information as the department may require.

Note: See s. 145.14 (2), Stats., for type of work classifications and the work permitted under each.

(3) **RESPONSIBILITY OF EMPLOYER.** (a) Registration as a registered learner may not be accepted unless the particular organization in which the learner is to work is equipped to have a learner in the specific restricted classification for which learner is requesting registration and the master plumber in charge is qualified to train the learner in the specific restricted classification. The master plumber in charge shall see that the requirements as to both practical and school training are complied with in accordance with subs. (5) and (6). The master plumber in charge shall report to the department any changes made in the relation to the continued employment of a learner. All changes in relation to the continued employment of registered learners shall be subject to the approval of the department.

(b) For each registered learner there shall be at least one journeyman plumber or journeyman plumber-restricted. For this purpose, a master plumber or master plumber-restricted may act as a journeyman plumber or a journeyman plumber-restricted, respectively.

(4) **SUSPENSION OR CANCELLATION OF REGISTRATION.** (a) Whenever the employment of a registered learner is terminated or whenever a registration is accepted under such conditions as would not warrant an acceptance if the facts are presented, or when there is willful noncompliance with the shop and school training requirements, the department shall suspend such registration until the conditions are remedied or shall cancel such registration, if necessary.

(b) A registration which has lapsed either through suspension or cancellation may be renewed in the same manner as a new registration and the department may grant such credit toward completion of the 1-year learner program as it may deem proper in each case.

Register, May, 1988, No. 389

(c) A person's registration as a registered learner shall be cancelled if the registrant has not completed the plumbing instruction requirements of sub. (5) and has not applied and taken the initial examination for a journeyman plumber-restricted license within 18 months from the date of learner registration.

(d) A person whose learner registration is cancelled shall consult with the department and obtain department approval before re-registering. The department may permanently cancel a learner's registration.

(5) PLUMBING INSTRUCTION. Unless a graduate of an accredited plumbing trade school approved by the department, a registered learner shall complete a minimum of 100 units of educational credit in plumbing related instruction.

(a) All educational courses and their corresponding units of credit shall be approved by the department.

1. All approved courses shall be set up in a competency based instruction format.

2. Courses may be taken through a correspondence format with the approval of the department.

3. All approved courses shall include a final examination.

4. Completion of an approved course shall be contingent upon the successful passage of the final examination.

5. In order to pass a final examination, a grade of 75% or greater shall be obtained.

6. Failure to pass a final examination shall necessitate the registered learner to repeat the course.

a. Failure of a final examination shall result in the probation of a learner's registration for a period of not more than one year.

b. A second failure in the final examination of the same course shall result in the cancellation of a learner's registration.

7. The results of the final examinations shall be immediately forwarded to the department.

(b) A registered learner in a sewer service classification shall obtain a minimum of 100 units of educational credit in the courses specified in Table 81.03-1.

TABLE 81.03-1
REGISTERED LEARNER-SEWER SERVICE

Subject Areas	Minimum Educational Credits in Units
State Uniform Plumbing Code	40
Blueprint Reading	20
Transit or Builder's Level	10
Construction Related Mathematics	20
First Aid and Safety	10
Other Approved Substitute Subjects	(As permitted by the department)

ILHR 81

(c) A registered learner in an appliances, equipment and devices classification shall obtain a minimum of 100 units of educational credit in the courses specified in Table 81.03-2.

TABLE 81.03-2

REGISTERED LEARNER-APPLIANCE, EQUIPMENT
AND DEVICES

Subject Areas	Minimum Educational Credits in Units
State Uniform Plumbing Code	40
Blueprint Reading	20
Plumbing Related Mathematics	10
Appliance & Equipment Servicing	30
Other Approved Substitute Subjects	(As permitted by the department)

(6) **PRACTICAL TRAINING.** The learner shall receive instruction and experience in all branches of the type of plumbing as restricted under registration. The learner shall be given the opportunity to install plumbing materials as the learner's skill will permit under the specific registration. All work shall be performed under the immediate supervision of a journeyman or master plumber or journeyman plumber or master plumber-restricted, licensed in Wisconsin.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83; r. and recr. (3), Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 81.04 Qualifications for licensure examinations. (1) **GENERAL.** Applicants for examination for licensure as a master plumber, master plumber-restricted, journeyman plumber, or journeyman plumber-restricted shall comply with the qualification requirements specified in s. 145.07, Stats.

(2) **MASTER PLUMBER APPLICANTS.** A person who has acquired a journeyman plumber license from the department and who has obtained, in less than 3 years from the acquisition date of the journeyman plumber license, a master plumber license from another state or a municipality outside the state shall acquire at least 1,000 hours of experience per year for 3 or more consecutive years as a licensed plumber to be eligible for licensure examination as a Wisconsin master plumber.

(3) **ENGINEERING GRADUATES.** Engineering graduates of an approved engineering school or college who are applying for examination for licensure as a master plumber shall have received a degree in civil engineering, mechanical engineering, agricultural engineering or other approved engineering curriculum related to plumbing. Such applicants shall submit their college transcripts to the department along with their licensure applications. Department acceptance of such applications shall be contingent upon the approval of the applicant's college transcripts.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

ILHR 81.05 Plumbing licensure examinations. (1) **GENERAL.** Not less than 4 examinations for the licensing of journeyman and master plumbers and journeyman plumber and master plumbers-restricted shall be conducted annually at such time and place as the department may direct. Application forms for examination for licensure may be obtained from the department.

Register, May, 1988, No. 389

(2) APPLICATIONS. (a) All applications for licensure examination shall be received by the department at least 4 weeks prior to the date of the examination. Failure to have the application on file with the department within the required time shall necessitate postponement of the applicant's appearance to the next examination.

(b) All applications shall expire after a period of one year from the date of filing.

(c) All applicants for licensure examinations shall submit the appropriate proof of experience, skill and proof of completion of the required educational instruction as required by either s. ILHR 81.02 (5) or 81.03 (5) including, but not limited to, grades for competency examinations and course examinations.

Note: See s. ILHR 81.04 and ss. 145.07 and 145.09, Stats., for the types of experience, skill and instruction required.

(3) FEES. Fees for the examinations are regulated by s. 145.08, Stats. Fees for licensure examination shall be nonrefundable.

(4) NOTICE OF EXAMINATION TO APPLICANTS. Notice of the time and place of examination shall be sent by first class mail to those who have approved applications on file. Such notice shall be mailed to the address given on the application form and shall be presented by the applicant to gain admittance to the examination room. Failure to receive the notice due to change in address shall not be the responsibility of the department.

(5) NONATTENDANCE AT EXAMINATION. Failure to appear at a scheduled licensure examination without giving prior notice to the department shall necessitate the submittal of a reexamination fee in order to maintain a valid examination application.

(6) CHARACTER OF EXAMINATIONS. (a) The examination shall be conducted by the plumbers' council. The examination shall consist of written and practical tests. No oral examinations shall be given. The examination shall cover the theory and practice of plumbing, the interpretation of charts, blueprints and plans of plumbing installations, and such other tests as the committee may deem necessary.

(b) Examinations shall consist of the following:

1. Written work based on the state uniform plumbing code;
2. Chart work based on the state uniform plumbing code; and
3. Practical plumbing work.

(c) Applicants shall participate in all portions of examination and shall acquire a passing grade in each portion to become eligible for licensure. A grade of 75% or greater in each portion shall be considered a passing grade.

(d) The department may conduct oral reviews with applicants after completion of the examination.

(7) MATERIALS USED IN EXAMINATION. Applicants shall furnish the necessary tools and material for the examination as requested by the examiners.

ILHR 81

(8) **REEXAMINATION.** (a) Qualified applicants failing a licensure examination may apply for reexamination in accordance with the procedures of sub. (2).

Note: Pursuant to ss. 145.03, 145.06, and 145.14, Stats., after the expiration of an apprenticeship term or a learner's registration term, no apprentice or registered learner may engage in or work at plumbing, unless the person secures a journeyman plumber license, a journeyman plumber-restricted license or is re-indentured as an apprentice or is re-registered as a learner.

(b) Applicants failing a licensure examination shall be reexamined only in those portions failed.

(9) **APPLICATION FOR LICENSE.** An applicant who has successfully passed a licensure examination may submit an application for the appropriate license within 60 days from the date the department has mailed the examination results. Failure to apply for a license within this time period shall necessitate reexamination.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83; r. (8) (b), renum. (8) (c) to be (8) (b), Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 81.06 Temporary permits. The department may issue a temporary permit upon receipt of a completed application and the appropriate fee for a qualified person to engage in plumbing work as a master plumber, master plumber-restricted, journeyman plumber or journeyman plumber-restricted. Applicants for temporary permits shall comply with all other applicable rules and statutes.

(1) **SPECIAL EXAMINATION.** (a) The department shall require passage of a special examination to determine the qualifications of an applicant before a temporary permit may be issued.

(b) Special examinations for temporary permits shall be conducted in accordance with s. ILHR 81.05 (6).

(2) **EXPIRATION.** Temporary permits shall become void upon the date of the first corresponding licensure examination following issuance of a temporary permit and shall be surrendered to the department.

(3) **LIMITATIONS.** Not more than 2 temporary permits shall be issued to an individual in any 12-month period.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

ILHR 81.07 Exchange of licenses without examination. All master plumbers or master plumbers-restricted in good standing and currently licensed by the department who work as journeyman plumbers or journeyman plumbers-restricted may, upon application and upon payment of the appropriate initial license fee, be issued either journeyman plumber licenses or journeyman plumber-restricted licenses, respectively, without licensure examination. A currently licensed journeyman plumber or journeyman plumber-restricted who has renewed a master plumber's license within 5 years preceding the date of application for exchange, may be relicensed as either a master plumber or master

sprinkler maintenance registration certificate under sub. (2) (c) leaves the employment of the business establishment, the business establishment:

- (a) Shall surrender to the department its automatic fire sprinkler maintenance registration certificate; and
- (b) May apply for a new automatic fire sprinkler system registration certificate or a temporary permit.

(7) **FITTER MAINTENANCE REGISTRATION.** An employe of a business establishment possessing a valid automatic fire sprinkler maintenance registration certificate shall obtain from the department an automatic fire sprinkler fitter maintenance registration certificate before engaging in any of the repair or maintenance activities specified in sub. (5).

(a) *Limitations of registration certificate.* 1. A person possessing a valid automatic fire sprinkler fitter maintenance registration certificate may perform the repair and maintenance activities specified in sub. (5) for only one business establishment.

2. The automatic fire sprinkler fitter maintenance registration certificate shall indicate the specific business establishment for which a person may perform the repair and maintenance activities specified in sub. (5).

3. Upon the expiration, revocation or nonrenewal of the automatic fire sprinkler maintenance registration certificate of the business establishment, all automatic fire sprinkler fitter maintenance registration certificates issued under that business establishment shall become invalid.

(b) *Application.* A person seeking an automatic fire sprinkler fitter maintenance registration certificate shall submit to the department:

- 1. A completed application on forms furnished by the department; and

Note: Application for fitter registration certificate is to be made on form SBD 6796.

- 2. The registration certificate fee specified in s. ILHR 81.16.

(c) *Termination of employment.* If for any reason an employe possessing a valid automatic fire sprinkler fitter maintenance registration certificate leaves the employment of the business establishment for which the person may perform the repair and maintenance activities specified in sub. (5), the registration certificate shall expire on the day of termination.

(8) **REVOCATION OF CERTIFICATES.** Pursuant to s. ILHR 81.14, the department may revoke any automatic fire sprinkler maintenance registration certificate of a business establishment or any automatic fire sprinkler fitter maintenance registration certificate.

(9) **TESTING AND EMERGENCY REPAIRS.** The weekly or monthly testing of sprinkler alarm equipment, fire pumps, valves, or appurtenances; the refilling of storage and pressure tanks; or replacement of automatic fire sprinkler heads under emergency conditions, shall not require registration under this subchapter.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

ILHR 81.12 Expiration of licenses and registrations. Except as provided in ss. ILHR 81.08 (2) and 81.16 (7), no license or registration issued

Register, May, 1988, No. 389

ILHR 81

under this subchapter shall be valid for longer than one year and all licenses and registrations shall expire on December 31 of each year.

(1) A license or a registration may be renewed upon application and payment of a renewal fee received by the department prior to the date of expiration.

(2) A license or a registration may be renewed upon application and payment of a renewal fee and late fee received by the department within 3 months following the date of expiration.

(3) The department may renew a license or a registration upon application and payment of a renewal fee and a late fee received by the department more than 3 months following the date of expiration, if it is determined that the applicant has good cause for not making an application for renewal within the 3 months following the date of expiration.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83; r. and recr. Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 81.13 License and registration renewal. (1) **ANNUAL NOTICE FOR RENEWAL OF LICENSES AND REGISTRATIONS.** Notice for the renewal of licenses and registrations issued under this subchapter shall be sent to all licensees and registrants whose licenses or registrations were in force during the previous year.

(a) A renewal notice shall be sent to the address given on the latest license or registration renewal form on file with the department.

(b) A licensee shall be responsible for notifying the department of any change in the licensee's mailing address.

(c) Failure to receive a notice for license or registration renewal shall not be an excuse for failure to renew.

(2) **RENEWAL APPLICATION.** License renewal shall be contingent upon the completion of the appropriate renewal application. The renewal application may include a department survey relative to the use of the applicant's license or registration. Failure to complete the survey shall result in the denial for renewal of a license or registration.

(3) **DELINQUENT OR ELAPSED LICENSES.** (a) *Plumber licenses.* 1. Master plumber and master plumber-restricted licenses shall be renewed within 5 years from the date of issuance. Failure to do so shall require reexamination to again qualify for licensure. Renewal of a delinquent or elapsed master plumber license or master plumber-restricted license that has not been renewed in accordance with s. ILHR 81.12 shall require the applicant to have a valid journeyman plumber license or journeyman plumber-restricted license, respectively. Upon the renewal of the master license, a licensee may exchange their license for the appropriate journeyman license in accordance with s. ILHR 81.07.

2. Journeyman plumber and journeyman plumber-restricted licenses shall be renewed in accordance with s. ILHR 81.12. Failure to do so shall require reexamination to again qualify for licensure.

3. With respect to s. 145.05 (1), Stats., a person, who as a municipal plumbing inspector of a city of the first, second or third class, having a system of waterworks or sewerage, has not renewed their respective plumbing license annually, upon termination as a municipal plumbing

inspector may renew their respective plumbing license without payment of a late renewal fee and without licensure re-examination, if a renewal application is submitted within the licensure year when termination occurs. Failure to do so shall require reexamination to again qualify for licensure. Municipal inspectors who do not renew their respective plumbing licenses annually may not engage in the installation of plumbing in accordance with s. 145.06, Stats.

(b) *Utility contractor licenses.* Whenever a person fails to renew a utility contractor license for a period of 3 years, the department shall require evidence to show that the renewal applicant is competent to perform the work of utility contractor before such license is renewed.

(c) *Automatic sprinkler licenses.* Whenever a person fails to renew a sprinkler fitter or contractor license for a period of 2 years, the department shall require evidence to show that the applicant for renewal is competent to perform the work of either a contractor or journeyman fire sprinkler fitter before such a license is renewed.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83; am. (3) a 1. and 2., Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 81.11 Suspension and revocation of licenses. Pursuant to ss. 145.10 and 145.17, Stats., the department may suspend or revoke the license of any master plumber, journeyman plumber, master plumber-restricted, journeyman plumber-restricted, utility contractor, automatic fire sprinkler contractor, or journeyman automatic fire sprinkler fitter.

(1) **GENERAL.** The department may suspend or revoke a license for any of the following reasons:

- (a) The practice of fraud or deceit in obtaining a license;
- (b) Gross negligence, incompetence or misconduct in the practice or work allowed by the license;
- (c) Failure to correct an installation for which the licensee is responsible within the time prescribed by the department; and

Note: Section 145.10 (1) b., Stats., indicates that the correction of an installation must take place within 30 days following notification by the department of a violation.

- (d) Falsified information on an inspection form under s. 144.24 (10) c., Stats.

(2) **INVESTIGATIONS.** The department may conduct an investigation of any alleged violations of this chapter or chs. ILHR 82 and 83. If it is determined that no further action is warranted, the department shall notify the persons affected. If the department determines that there is probable cause, it shall order a hearing and notify the persons affected.

(3) **SUMMARY SUSPENSION.** In accordance with s. 145.10 (1), Stats., the department may summarily suspend any license after providing not less than 10 days notice to the licensee, if it has reason to believe that the allegations in the complaints are justified. The summary suspension shall remain in effect until after a hearing finding is reached.

(4) **HEARINGS.** Hearings for the suspension or revocation of licenses shall be conducted as contested case hearings in accordance with ch. 227, Stats., and s. 145.10, Stats.

(5) **FINDINGS.** The department may make findings and enter its order on the basis of the facts revealed by its investigation. Any findings as a result of petition or hearing shall be in writing and shall be binding unless appealed to the secretary.

(a) *Suspension.* The period for suspension shall be determined by the hearing examiner or the department. The period for suspension may not exceed one year. A person whose license has been suspended may have the license reinstated by filing a new application for licensure and payment of the appropriate fee specified in s. ILHR 81.16.

(b) *Revocation.* The period for revocation shall be determined by the hearing examiner or the department. The period for revocation shall not exceed one year. A person whose license has been revoked shall be eligible for licensure only after the time set for revocation by department order has passed. A person whose license has been revoked may have the license reinstated only after submitting a completed application for licensure examination, payment of the examination fee, passing of the examination and payment of the license fee specified in s. ILHR 81.16.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

ILHR 81.15 Suspension and cancellation of registrations. The department may suspend or cancel the registration of any plumbing apprentice, registered learner, pipe layer, automatic fire sprinkler system apprentice, automatic fire sprinkler maintenance registration certificate or automatic fire sprinkler fitter maintenance registration certificate.

(1) **GENERAL.** The department may suspend or cancel a registration for any of the following reasons:

- (a) The practice of fraud or deceit in obtaining registration;
- (b) Failure to complete the apprenticeship or learner educational requirements of this subchapter;
- (c) Gross negligence, incompetence or misconduct in the practice or work allowed by the registration; and
- (d) Willful noncompliance with the apprenticeship or learner shop requirements needed to obtain registration.

(2) **COMPLAINTS TO APPRENTICESHIP AND TRAINING DIVISION.** The department may file a complaint with the apprenticeship and training division of the department of industry, labor and human relations regarding violations of this chapter or chs. ILHR 82 and 83 and request that action be taken to terminate or reassign the apprenticeship contract or agreement.

(3) **NOTICE OF SUSPENSION OR CANCELLATION.** Upon suspension or cancellation of any registration, the department shall notify the affected persons in writing stating the reasons for suspension or cancellation. The notice shall be made by affidavit of mailing or certified mail sent to the address filed with the application for registration.

(4) **HEARINGS.** Upon receipt of notice of registration, suspension or cancellation, the registrant may submit a written request for a contested case hearing in accordance with ch. 227, Stats. The right to hearing shall be considered waived, if the registrant fails to submit the request within

Register, May, 1988, No. 389

30 days after notice of registration, suspension or cancellation. Hearings shall be conducted by the department.

History: Cr. Register, April, 1983, No. 328, eff. 5-1-83.

ILHR 81.16 Examination, licensure & registration fees. (1) MASTER PLUMBER. The fees shall be as follows for master plumber:

(a) *Examination fee.* Master plumber examination, \$50. Each subsequent examination, \$30.

Next page is numbered 21

Chapter ILHR 82

DESIGN, CONSTRUCTION, INSTALLATION SUPERVISION AND INSPECTION OF PLUMBING

ILHR 82.01	Scope (p. 39)	ILHR 82.34	Interceptors and catch basins for special and industrial wastes (p. 96-1)
ILHR 82.03	Application (p. 39)	ILHR 82.35	Cleanouts (p. 106)
	Subchapter I	ILHR 82.36	Storm and clear water drain systems (p. 110)
	Plumbing Principles and Definitions		Subchapter IV
ILHR 82.10	Basic plumbing principles (p. 39)		Water Supply Systems
ILHR 82.11	Definitions (p. 41)	ILHR 82.40	Water supply systems (p. 117)
	Subchapter II	ILHR 82.41	Back-siphonage, cross-connections and potability control (p. 135)
	Administration and Enforcement		Subchapter V
ILHR 82.20	Plan review and approval (p. 53)		Special Plumbing Installations
ILHR 82.21	Testing and maintenance (p. 58)	ILHR 82.50	Health care related facilities (p. 147)
	Subchapter III	ILHR 82.51	Mobile home sites and parks (p. 159)
	Drain and Vent Systems		Subchapter VI
ILHR 82.30	Sanitary drain systems (p. 61)		Installation
ILHR 82.31	Vents and venting systems (p. 77)	ILHR 82.60	Pipe hangers and supports (p. 160)
ILHR 82.32	Traps and direct fixture connections (p. 89)		
ILHR 82.33	Indirect and local waste piping (p. 91)		

Note: Sections ILHR 82.01 to 82.25, 82.15 and 82.17 to 82.25 as they existed on February 28, 1985 were repealed and new sections ILHR 82.01 to 82.36 and 82.51 and 82.60 were created effective March 1, 1985.

ILHR 82.01 Scope. The provisions of this chapter apply to the design, construction and installation of plumbing, including but not limited to sanitary and storm drainage, water supplies, storm water and sewage disposal for buildings.

Note: Chapter ILHR 83 contains provisions for the siting, design, installation, inspection and maintenance of private sewage systems. Chapter ILHR 84 contains provisions and standards for plumbing materials, plumbing fixtures and plumbing appliances.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85.

ILHR 82.03 Application. The provisions of this chapter are not retroactive, unless specifically stated otherwise in the rule.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85.

Subchapter I

Plumbing Principles and Definitions

ILHR 82.10 Basic plumbing principles. This chapter is founded upon certain basic principles of environmental sanitation and safety through properly designed, installed, and maintained plumbing systems. Some of the details of plumbing construction may vary, but the basic sanitary and safety principles desirable and necessary to protect the health of people are the same everywhere. As interpretations may be required, and as unforeseen situations arise which are not specifically addressed, the following principles shall be used to define the intent of this chapter.

(1) Plumbing in all buildings, public and private, intended for human occupancy, shall be installed and maintained in such a manner so as to protect the health, safety and welfare of the public or occupants.

(2) Every building intended for human occupancy shall be provided with an adequate, safe and potable water supply. A potable water supply shall not be connected to an unsafe water supply or a drain pipe, nor shall it be subject to the hazards of backflow or back siphonage. A building located adjacent to a street in which there is a public water supply, shall be connected to the public water supply by means of individual connections or private mains.

(3) In accordance with chs. Ind 20 to 25, each dwelling unit connected to a private sewage system or public sewer shall have at least one water closet, one wash basin, one kitchen sink and one bathtub or shower to meet the basic requirements of sanitation and personal hygiene. All other structures for human occupancy shall be equipped with sanitary facilities in sufficient numbers as specified in chs. ILHR 50 to 64.

(4) Plumbing fixtures, appliances and appurtenances, whether existing or to be installed, shall be supplied with water in sufficient volume and at pressures adequate to enable them to function properly and efficiently at all times and without undue noise under normal conditions of use. Plumbing systems shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

(5) Hot or tempered water shall be supplied to all plumbing fixtures which normally require hot or tempered water for proper use and function.

(6) Devices for heating water and storing it in pressure vessels or tanks shall be so designed and installed as to prevent dangers of explosion or overheating.

(7) Every building with installed plumbing fixtures and intended for human occupancy, located adjacent to a street in which there is public sewer service, shall be connected to the public sewer by means of individual connections or private interceptor mains.

(8) Where plumbing fixtures exist in a building which is not connected to a public sewer system, suitable provision shall be made for disposing of the building sewage by a method of sewage treatment or disposal satisfactory to the department and the governmental unit responsible for the regulation of private sewage systems.

(9) Drain systems shall be designed, constructed, and maintained to conduct the waste water or sewage quickly from the fixture to the place of disposal, with velocities which will prevent clogging, fouling and the depositing of solids, and shall have adequate cleanouts so arranged that the drain pipes may be readily cleaned.

(10) The drain systems shall be designed so that there is an adequate circulation of air in all pipes and no danger of siphonage, aspiration or forcing of trap seals under conditions of ordinary use.

(11) The piping of a plumbing system shall be of durable material, free from defective workmanship, and designed and constructed to give satisfactory service for its reasonable expected life.

(12) Plumbing fixtures shall be made of durable, smooth, nonabsorbent and corrosion resistant material, and shall be free from concealed fouling surfaces.

(13) Proper protection shall be provided to prevent contamination of food, water, sterile goods and similar materials by backflow of sewage.

(14) All plumbing fixtures shall be installed to provide adequate spacing and accessibility for the intended use and for cleaning.

(15) All rooms in which water closets, urinals or similar fixtures are installed shall be provided with adequate lighting and proper ventilation.

Note: See ss. ILHR 52.53 to 52.55 for toilet rooms located in commercial and public buildings.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85.

ILHR 82.11 Definitions. In chs. ILHR 82 and 84:

(1) "Accepted engineering practice" means a specification, standard, guideline or procedure in the field of construction or related thereto, generally recognized and accepted as authoritative.

(2) "Accessible" when applied to a fixture, appliance, pipe, fitting, valve or equipment, means having access thereto, but which first may require the removal of an access panel or similar obstruction.

(3) "Air-break" means a piping arrangement for a drain system where the wastes from a fixture, appliance, appurtenance or device discharge by means of indirect or local waste piping terminating in a receptor at a point below the flood level rim of the receptor and above the inlet of the trap serving the receptor.

(4) "Air-gap, drain system" means the unobstructed vertical distance through free atmosphere between the outlet of indirect or local waste piping and the flood level rim of the receptor into which it discharges.

(5) "Air-gap, water supply system" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, vat, plumbing fixture or other device and the flood level rim of the fixture, device or receptor.

(6) "Alignment" means installed in a straight line, either horizontal, vertical or at a given angle.

(7) "Anti-siphon" means a term applied to valves or mechanical devices which eliminate siphonage.

(8) "Anti-siphon ballcock" means an anti-siphon device in the form of an approved air gap or vacuum breaker which is an integral part of the ballcock unit and which is positioned on the discharge side of the water supply control valve.

(9) "Approved" means acceptable to the department.

(10) "Area drain" means a receptor designed to collect surface or storm waters from an open area.

(11) "Areawide water quality management plan" means those plans prepared by the department of natural resources, including those plans

prepared by agencies designated by the governor under the authority of ss. 144.025 (1) and (2), and 147.25, Stats., for the purpose of managing, protecting and enhancing groundwater and surface water of the state.

Note: See Appendix for further explanatory material.

(12) "Aspirator" means a fitting or device supplied with water or other fluid under positive pressure which passes through an integral orifice or constriction causing a vacuum.

(13) "Autopsy table" means a fixture or table used for post-mortem examination.

(14) "Backflow" means the unwanted reverse flow of liquids in a piping system.

(15) "Backflow connection" means any arrangement whereby backflow can occur.

(16) "Back-pressure" means a pressure higher than the water supply pressure which may cause backflow.

(17) "Backflow preventer" means a device or means to prevent backflow.

(18) "Back-siphonage" means backflow caused by the formation of a vacuum or partial vacuum in a water supply pipe.

(19) "Backwater valve" means a device designed to prevent the reverse flow of storm water or sewage into the drain system.

Note: Back vent, see "individual vent".

(20) "Ballcock" means a water supply valve opened or closed by means of a float or similar device used to supply water to a tank.

(21) "Bathroom group" means a water closet, lavatory and a bathtub or shower located together on the same floor level.

(22) "Battery of fixtures" means any group of 2 or more fixtures which discharge into the same horizontal branch drain.

(23) "Bedpan sterilizer" means a fixture used for sterilizing bedpans or urinals by direct application of steam, boiling water or chemicals.

(24) "Bedpan washer and sanitizer" means a fixture designed to wash bedpans and to flush the contents into the sanitary drain system and which may also provide for disinfecting utensils by scalding with steam or hot water.

(25) "Bedpan washer hose" means a device supplied with hot or cold water, or both, and located adjacent to a water closet or clinical sink to be used for cleansing bedpans.

(26) "Bell" means the portion of a pipe which is enlarged to receive the end of another pipe of the same diameter for the purpose of making a joint.

(27) "Boiler blow-off basin" means a vessel designed to receive the discharge from a boiler blow-off outlet and to cool the discharge to a temperature which permits safe entry into the drain system.

(28) "Branch" means a part of a piping system other than a riser, main or stack.

(29) "Branch interval" means the vertical distance along a drain stack measured from immediately below a branch drain connection to immediately below the first lower branch drain connection which is 8 feet or more below.

Note: See Appendix for further explanatory material.

(30) "Branch vent" means a vent serving more than one fixture drain.

(31) "B.T.U." means British Thermal Units.

(32) "Building" means a structure for support, shelter or enclosure of persons or property.

(33) "Building, public" means any structure, including exterior parts of such building, such as a porch, exterior platform or steps providing means of ingress or egress, used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy or use by the public, or by 3 or more tenants.

(34) "Building drain" means horizontal piping within or under a building, installed below the lowest fixture or the lowest floor level from which fixtures can drain by gravity to the building sewer.

(35) "Building drain branch" means a fixture drain which is individually connected to a building drain and is vented by means of a combination drain and vent system.

(36) "Building drain, sanitary" means a building drain which conveys sewage only.

(37) "Building drain, storm" means a building drain which conveys storm water wastes or clear water wastes, or both.

(38) "Building sewer" means that part of the drain system not within or under a building which conveys its discharge to a public sewer, private interceptor main sewer, private sewage system or other point of disposal.

(39) "Building sewer, sanitary" means a building sewer which conveys sewage only.

(40) "Building sewer, storm" means a building sewer which conveys storm water wastes or clear water wastes, or both.

(41) "Building subdrain" means the horizontal portion of a drain system which does not flow by gravity to the building sewer.

(42) "Burr" means a roughness or metal protruding from the walls of a pipe usually as the result of cutting the pipe.

(44) "Catch basin" means a watertight receptacle built to arrest sediment of surface, subsoil or other waste drainage, and to retain oily or greasy wastes, so as to prevent their entrance into the building drain or building sewer.

(45) "Circuit vent" means a branch vent that serves 2 or more fixture traps which discharge to a horizontal branch drain and connects to the horizontal drain at a point between the 2 most upstream, floor outlet fixtures.

(46) "Cleanout" means an accessible opening in a drain system used for the removal of obstructions.

(47) "Clear water wastes" means liquids other than storm water, having no impurities or where impurities are below a minimum concentration considered harmful by the department, including, but not limited to noncontact cooling water and condensate drainage from refrigeration compressors and air conditioning equipment, drainage of water used for equipment chilling purposes and cooled condensate from steam heating systems or other equipment.

(48) "Combination fixture" means a fixture combining one sink and laundry tray or a 2 or 3 compartment sink or laundry tray in one unit.

(49) "Combination drain and vent system" means a specially designed system of drain piping embodying the wet venting of one or more fixtures by means of a common drain and vent pipe adequately sized to provide free movement of air in the piping.

(50) "Common vent" means a branch vent connecting at or downstream from the junction of 2 fixture drains and serving as a vent for those fixture drains.

(51) "Conductor" means a drain pipe inside the building which conveys storm water from a roof to a leader, storm drain or storm sewer.

(52) "Contamination" means a general term meaning the introduction into the potable water supply of chemicals, wastes or sewage which will render the water unfit for its intended purpose.

(53) "Corporation cock" means a valve:

(a) Installed in a private water main or a water service at or near the connection to public water main; or

(b) Installed in the side of a forced main sewer to which a forced building sewer is connected.

(54) "Critical level" means the reference point on a vacuum breaker which must be submerged before backflow can occur. When the critical level is not indicated on the vacuum breaker, the bottom of the vacuum breaker shall be considered the critical level.

(55) "Cross-connection" means a physical connection or arrangement between 2 otherwise separate piping systems, one of which contains potable water and the other either water of unknown or questionable safety, steam, gas or chemicals whereby there may be a flow from one system to the other, the direction of flow depending on the pressure differential between the 2 systems.

(55m) "Cross-connection control device" means any mechanical device which automatically prevents backflow in a water supply system.

(56) "Curb stop" means a valve placed in a water service or a private water main.

(57) "Dead end" means a branch leading from a drain pipe, vent pipe, building drain or building sewer and terminating at a developed length of 2 feet or more by means of a plug, cap or other closed fitting.

(58) "Department" means the department of industry, labor and human relations.

(59) "Developed length" means the length of pipe line measured along the center line of the pipe and fittings.

(60) "Diameter" means in reference to a pipe the nominal inside diameter of the pipe.

Note: Downspout, see "leader".

(61) "Drain" means any pipe which carries waste water or water borne wastes.

(62) "Drain system" includes all the piping or any portion of the piping within public or private premises which conveys sewage, storm water or other liquid wastes to a legal point of disposal, but does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.

(63) "Dwelling unit" means a structure, or that part of a structure, which is used or intended to be used as a home, residence or sleeping place by one person or by 2 or more persons maintaining a common household, to the exclusion of all others.

(64) "Ejector" means an automatically operated device to elevate liquid wastes and sewage by the use of air under higher than atmospheric pressure.

(65) "Faucet" means a valve end of a water pipe by means of which water can be drawn from or held within the pipe.

(66) "Ferrule" means a rigid sleeve used to connect dissimilar plumbing materials.

(67) "Fixture drain" means the drain from fixture to a junction with another drain pipe.

(67m) "Fixture supply" means that portion of a water distribution system serving one plumbing fixture, appliance or piece of equipment.

(68) "Fixture supply connector" means that portion of water supply piping which connects a plumbing fixture, appliance or a piece of equipment to the water distribution system.

(69) "Fixture unit, drainage, dfu" means a measure of the probable discharge into the drain system by various types of plumbing fixtures. The drainage fixture unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation, and on the average time between successive operations.

(70) "Fixture unit, supply, sfu" means a measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures. The supply fixture unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation, and on the average time between successive operations.

(72) "Flood level rim" means the edge of the receptacle from which water overflows.

(73) "Floor sink" means a receptor for the discharge from indirect or local waste piping installed with its flood level rim even with the surrounding floor.

(75) "Flush valve" means a device located at the bottom of a tank for flushing water closets and similar fixtures.

(76) "Flushometer valve" means a device which discharges a predetermined quantity of water to fixtures for flushing purposes and is closed by direct water pressure.

(77) "Garage, private" means a building or part of a building used for the storage of vehicles or other purposes, by a family or less than 3 persons not of the same family and which is not available for public use.

(78) "Garage, public" means a building or part of a building which accommodates or houses self-propelled land, air or water vehicles for 3 or more persons not of the same family.

(79) "Grease interceptor" means a receptacle designed to intercept and retain grease or fatty substances.

(80) "Health care facility" means any building or part of a building used for purposes such as hospitals, nursing or rest homes, homes for the aged, infirmaries, residential care facilities, sanitariums, mortuaries, medical laboratories, and offices and clinics with operatories for dentists and doctors.

(81) "Horizontal pipe" means any pipe or fitting which makes an angle of less than 45° with the horizontal.

(82) "Hot water" means water at a temperature of 110° F. or more.

(83) "Hot water storage tank" means a tank used to store water that is heated indirectly by a circulating water heater or by steam or hot water circulating through coils or by other heat exchange methods internal or external to the tank.

(84) "Hydrostatic test" means a test performed on a plumbing system or portion thereof in which the system is filled with a liquid, normally water, and raised to a designated pressure.

(85) "Indirect waste piping" means drain piping which does not connect directly with the drain system, but which discharges into the drain system by means of an air break or air gap into a receptor.

(86) "Individual vent" means a pipe installed to vent a fixture trap.

(87) "Industrial wastes" means the liquid wastes which result from the processes employed in industrial establishments and which are free from fecal matter.

(88) "Interceptor" or "separator" means a device designed and installed so as to separate and retain deleterious, hazardous or undesirable matter from wastes flowing through it.

(89) "Journeyman plumber" means a person as defined in s. 145.01 (3), Stats.

(90) "Leader" means a pipe or channel outside a building which conveys storm water from the roof or gutter drains to a storm drain, storm sewer or to grade.

(91) "Load factor" means the percentage of the total connected fixture unit flow rate which is likely to occur at any point in the drain system.

(92) "Local waste piping" means a portion of drain piping which receives the wastes discharged from indirect waste piping and which discharges those wastes by means of an air break or air gap into a receptor.

(93) "Local vent" means a pipe connecting to a fixture and extending to outside air through which vapor or foul air is removed from the fixture.

(94) "Main" means the principal pipe artery to which branches may be connected.

(95) "Manhole" means an opening constructed to permit access to a sewer or any underground portion of a plumbing system.

(96) "Master plumber" means a person as defined in s. 145.01 (2), Stats.

(97) "Mechanical joint" means a connection between pipes, fittings or pipes and fittings by means of a device, coupling, fitting or adapter where compression is applied around the center line of the pieces being joined, but which is neither caulked, threaded, soldered, solvent cemented, brazed nor welded.

(98) "Mobile home" means a vehicle as defined in s. 101.91, Stats.

(99) "Mobile home drain connector" means the pipe which joins the drain piping for a mobile or manufactured home to the building sewer.

(100) "Mobile home park" means any plot or plots of ground as defined in s. 66.058, Stats.

(101) "Multiple dwelling" means a building containing more than 2 dwelling units.

(102) "Nonpotable water" means water not safe for drinking, personal or culinary use.

(103) "Nonpublic" means, in the classification of plumbing fixtures, those fixtures in residences, apartments, living units of hotels and motels, and other places where the fixtures are intended for the use by a family or an individual to the exclusion of all others.

(104) "Nuisance" means any source of filth or probable cause of sickness pursuant to the provisions of s. 146.14, Stats.

(105) "Oil interceptor" means a device designed to intercept and retain oil, lubricating grease or other similar materials.

(106) "Offset" means a combination of fittings or bends which brings one section of the pipe out of line but into a line parallel with the other section.

(107) "One or 2-family dwelling" means a building containing not more than 2 dwelling units.

(108) "Open air" means outside the building.

(109) "Pitch" means the gradient or slope of a line of pipe in reference to a horizontal plane.

(110) "Place of employment" means a place as defined in s. 101.01 (2) (a), Stats.

(111) "Plumbing" means piping, fixtures, appliances, appurtenances, devices and systems as defined in s. 145.01 (1), Stats.

(112) "Plumbing appliance" means any one of a special class of plumbing devices which is intended to perform a special function. The operation or control of the appliance may be dependent upon one or more energized components, such as motors, controls, heating elements, or pressure or temperature sensing elements. The devices may be manually adjusted or controlled by the user or operator, or may operate automatically through one or more of the following actions: a time cycle, a temperature range, a pressure range, a measured volume or weight.

(113) "Plumbing appurtenance" means a manufactured device or prefabricated assembly of component parts which is an adjunct to the basic piping system and plumbing fixtures. An appurtenance does not demand additional water supply, nor does it add any discharge load to a fixture or the drain system. It is presumed that the appurtenance performs some useful function in the operation, maintenance, servicing, economy, or safety of the plumbing system.

(114) "Plumbing fixture" means a receptacle or device which:

(a) Is either permanently or temporarily connected to the water distribution system of the premises, and demands a supply of water from the system;

(b) Discharges used water, waste materials, or sewage either directly or indirectly to the drain system of the premises; or

(c) Requires both a water supply connection and a discharge to the drain system of the premises.

(115) "Plumbing system" includes the water supply system, the drain system, the vent system, plumbing fixtures, plumbing appliances and plumbing appurtenances which serve a building, structure or premises.

(116) "Potable water" means water which is:

(a) Safe for drinking, personal or culinary use; and

(b) Free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in its bacteriological and chemical quality to the requirements specified in ch. NR 109.

(117) "Pressure relief valve" means a pressure actuated valve held closed by a spring or other means and designed to automatically relieve pressure at a designated pressure.

(118) "Private interceptor main sewer" means a privately owned sewer serving 2 or more buildings and not directly controlled by a public authority.

(119) "Private water main" means a privately owned water main serving 2 or more buildings and not directly controlled by a public authority.

(121) "Public" means, in the classification of plumbing fixtures, those fixtures which are available for use by the public or employees.

(122) "Public sewer" means a sewer owned and controlled by a public authority.

(123) "Public water main" means a water supply pipe for public use owned and controlled by a public authority.

(124) "Quick closing valve" means a valve or faucet that closes automatically when released manually or controlled by mechanical means for fast action closing.

(125) "Receptor" means a fixture or device which receives the discharge from indirect or local waste piping.

(126) "Reduced pressure principle type backflow preventer" means a device consisting of 2 independently acting check valves, spring loaded to a closed position and separated by an intermediate chamber in which there is an automatic relief vented to atmosphere, spring loaded to the open position.

(127) "Relief vent" means a vent which permits additional circulation of air in or between drain and vent systems.

(128) "Riser" means a water supply pipe which extends vertically one full story or more.

(129) "Roof drain" means a drain installed to receive water collecting on the surface of a roof and to discharge it into a conductor.

(130) "Roughing in" means the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures including drain, water supply and vent piping and the necessary fixture supports.

(131) "Row house" means a place of abode not more than 3 stories in height, arranged to accommodate 3 or more attached row living units in which each living unit is separated from the adjoining unit by a vertical occupancy separation of not less than one-hour fire-resistive construction, extending from the basement or lowest floor to the under side of the roof deck.

(132) "Safing" means a pan or other collector placed beneath a pipe or fixture to prevent leakage from escaping to the floor, ceiling or walls.

(133) "Sand interceptor" means a receptacle designed to intercept and retain sand, grit, earth and other similar solids.

(134) "Sanitary sewer" means a pipe which carries sewage excluding storm water, surface water, ground water and clear water wastes.

(135) "Sewage" means any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

(136) "Sewage grinder pump" means a type of sewage pump which macerates sewage.

(137) "Sewage pump" means an automatic pump for the removal of sewage from a sanitary sump.

(138) "Slip-joint" means a connection in which one pipe slips into another, the joint of which is made tight with a compression type fitting.

(139) "Spigot" means the end of a pipe which fits into a bell or hub.

(140) "Spring line, pipe" means the line or place from which the arch of a pipe or conduit rises.

Note: See Appendix for further explanatory material.

(141) "Stack" means a drain or vent pipe which extends vertically one full story or more.

(142) "Stack vent" means a vent extending from the top of a drain stack.

(143) "Standpipe" means a drain pipe serving as a receptor for the discharge wastes from indirect or local waste piping.

(144) "Sterilizer, boiling type" means a device of nonpressure type, used for boiling instruments, utensils, or other equipment for disinfection.

(145) "Sterilizer, instrument" means a device for the sterilization of various instruments.

(146) "Sterilizer, pressure instrument washer" means a pressure vessel designed to both wash and sterilize instruments during the operating cycle of the device.

(147) "Sterilizer, pressure" means a pressure vessel fixture designed to use steam under pressure for sterilizing.

Note: A pressure sterilizer is also referred to as an autoclave.

(148) "Sterilizer, utensil" means a device for the sterilization of utensils.

(149) "Sterilizer vent" means a separate pipe or stack, indirectly connected to the drain system at the lower terminal, which receives the vapors from nonpressure sterilizers, or the exhaust vapors from pressure sterilizers, and conducts the vapors directly to the outer air.

(150) "Sterilizer, water" means a device for sterilizing water and storing sterile water.

(151) "Storm sewer" means a pipe which carries storm water, surface water, ground water and clear water wastes.

(152) "Subsoil drain" means that part of a drain system which conveys the ground or seepage water from the footings of walls or below the basement floor under buildings to the storm sewer or other point of disposal.

(153) "Sump" means a tank or pit which receives sewage or liquid wastes, usually located below the normal grade of the gravity system and which must be emptied by mechanical means.

(154) "Sump pump" means an automatic water pump for the removal of drainage, other than raw sewage, from a sump, pit or low point.

(155) "Sump vent" means a vent pipe from a nonpressurized sump.

(156) "Supports" means hangers, anchors and other devices for supporting and securing pipes, or fixtures to structural members of a building.

(157) "Swimming pool" means a structure, basin, chamber or tank containing an artificial body of water for swimming, diving or recreational bathing having a depth of 2 feet or more at any point.

(158) "Temperature and pressure relief valve" means a combination relief valve designed to function as both a temperature relief and pressure relief valve.

(159) "Temperature relief valve" means a temperature actuated valve designed to automatically discharge at a designated temperature.

(159m) "Tempered water" means water ranging in temperature from 85° F. to less than 110° F.

(160) "Trap" means a fitting, device or arrangement of piping so designed and constructed as to provide, when properly vented, a liquid seal which prevents emission of sewer gases without materially affecting the flow of sewage or waste through it.

(161) "Trap seal" means the vertical distance between the top of the trap weir and the top of the dip separating the inlet and outlet of the trap.

(162) "Trap weir" means that part of a trap which forms a dam over which wastes must flow to enter the drain piping.

(163) "Turf sprinkler system" means a system of piping, appurtenances and devices installed underground to distribute water for lawn or other similar irrigation purposes.

(164) "Vacuum" means any pressure less than that exerted by the atmosphere.

(165) "Vacuum breaker" means an atmospheric device installed and designed to protect a water supply against back-siphonage by allowing the entry of air to relieve vacuums in the water distribution systems.

(166) "Vacuum relief valve" means a device which admits air into the water distribution system to prevent excessive vacuum in a water storage tank or heater.

(167) "Vent" means a part of the plumbing system used to equalize pressures and ventilate the system.

(168) "Vent header" means a branch vent which connects 2 or more stack vents or vent stacks or both and extends to the outside air.

(169) "Vent stack" means a vertical vent pipe which extends one or more stories.

(170) "Vent system" means a pipe or pipes installed to provide a flow of air to or from a drain system, or to provide a circulation of air within the system to protect trap seals from siphonage and back pressure.

(171) "Vertical pipe" means any pipe or fitting which makes an angle of 45° or less with the vertical.

(172) "Wall mounted water closet" means a water closet attached to a wall in such a way that it does not touch the floor.

(173) "Waste" means the discharge from any fixture, appliance, area or appurtenance.

(174) "Waste sink" means a receptor for the discharge from indirect or local waste piping installed with its flood level rim above the surrounding floor.

(175) "Water closet" means a water flushed plumbing fixture designed to receive human excrement directly from the user of the fixture.

(176) "Water conditioner" means an appliance, appurtenance or device used for the purpose of ion exchange, demineralizing water or other methods of water treatment.

(177) "Water distribution system" means that portion of a water supply system from the building control valve to the connection of a fixture supply connector, plumbing fixture, plumbing appliance, water using equipment or other piping systems to be served.

(178) "Water heater" means any heating device with piping connections to the water supply system which is intended to supply hot water for domestic or commercial purposes other than space heating.

(179) "Water service" means that portion of a water supply system from the water main or private water supply to the building control valve.

(180) "Water supply system" means the piping of a private water main, water service and water distribution system, fixture supply connectors, fittings, valves, and appurtenances through which water is conveyed to points of usage such as plumbing fixtures, plumbing appliances, water using equipment or other piping systems to be served.

(181) "Water treatment device" means a device which:

(a) Renders inactive or removes microbiological, particulate, inorganic, organic or radioactive contaminants from water which passes through the device or the water supply system downstream of the device; or

(b) Injects into the water supply system gaseous, liquid or solid additives other than water, to render inactive microbiological, particulate, inorganic, organic or radioactive contaminants.

(185) "Wet vent" means that portion of a vent pipe which receives the discharge of wastes from other than water closets, urinals or other fixtures which discharge like sewage or fecal matter.

(186) "Yoke vent" means a vent connected to a drain stack for the purpose of preventing pressure changes in the drain stack.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. (43), (71), (74), (120), (177) to (184), r. and recr. (53), (68) and (115), am. (56) and (163), cr. (55m), (67m), (159m), (177) to (181), Register, May, 1988, No. 389, eff. 6-1-88.

Subchapter II

Administration & Enforcement

ILHR 82.20 Plan review and approval. (1) **GENERAL.** Plumbing plans and specifications shall be submitted to the department or to an approved agent municipality for review in accordance with pars. (a) and (b).

(a) *Department review.* Plumbing plans and specifications for the types of plumbing installations listed in Table 82.20-1 shall be submitted to the department for review, regardless of where the installation is to be located. Written approval for the plumbing plans shall be obtained prior to installation of the plumbing.

Table 82.20-1
SUBMITTALS TO DEPARTMENT

Type of Plumbing Installation
1. All plumbing, new installations, additions and alterations, regardless of the number of plumbing fixtures involved, to be installed in health care facilities.
2. Plumbing, new installations, additions and alterations involving 6 or more plumbing fixtures, to be installed in buildings owned by a metropolitan or sanitary sewer district. ^a
3. Plumbing, new installations, additions and alterations involving 6 or more plumbing fixtures, to be installed in buildings owned by the state. ^a
4. Engineered plumbing systems.
5. Controlled roof drainage systems.
6. Reduced pressure zone principle backflow preventers.
7. Water treatment devices for removing contaminants exceeding the maximum contaminant levels specified in chs. NR 140 or NR 109.

Note a: A water heater is to be counted as a plumbing fixture.

(b) *Department or agent municipality review.* Plumbing plans and specifications for the types of plumbing installations listed in Table 82.20-2 shall be submitted for review to an agent municipality, if the installation is to be located within the agent municipality or to the department, if the installation is not to be located within an agent municipality. A municipality shall be designated as an agent municipality in accordance with sub. (2). Written approval for the plumbing plans shall be obtained prior to installation of the plumbing.

Table 82.20-2
SUBMITTALS TO DEPARTMENT OR AGENT MUNICIPALITY

Type of Plumbing Installation
1. New installations, additions and alterations to drain systems, vent systems, water service systems, and water distribution systems involving 6 or more plumbing fixtures to be installed in public buildings.^{a,b} 2. Grease interceptors to be installed for public buildings. 3. Garage catch basins and oil interceptors to be installed for public buildings. 4. Automatic car wash facilities. 5. Sanitary dump stations. 6. Turf sprinkler systems connected to a potable water system. 7. Private water mains. 8. Water supply systems and drain systems to be installed for mobile home parks and campgrounds.^c 9. Private interceptor main sewers.^c 10. Chemical waste systems regardless of the number of plumbing fixtures involved.^c

Note a: A water heater is to be counted as a plumbing fixture.

Note b: For the purpose of plan submittal, public buildings do not include zero-lot-line row houses where each living unit is served by an individual water service and an individual building sewer.

Note c: Only agent municipalities which are cities of the first class may review these types of installations.

1. Plan review and approval of one- and 2-family dwellings. Review and approval of plumbing plans for one- and 2-family dwellings shall be in accordance with the provisions specified in s. ILHR 20.09.

2. Local review. An agent municipality may require by local ordinance the submittal and review of plumbing plans for those installations involving 5 or less plumbing fixtures.

(2) AGENT MUNICIPALITIES. The department may designate to an approved municipality the authority to review and approve plumbing plans and specifications for those plumbing installations to be located within the municipality's boundary limits and which require approval under sub. (1) (b).

(a) An agent municipality shall employ at least 2 full time plumbing inspectors who have been qualified by the department.

1. The primary duties of the plumbing inspectors shall include plumbing plan review.

2. The plumbing inspectors shall be Wisconsin licensed master or journeyman plumbers.

Note: See Appendix for listing of agent municipalities.

(b) An agent municipality may waive its jurisdiction for plan review and approval for any project, in which case plans shall be submitted to the department for review and approval.

(c) Agent municipalities may set by ordinance the fees for plan review services.

(3) **PRIORITY PLAN REVIEW.** An appointment may be made with the department to facilitate the examination of plumbing plans in less than the normal processing time. Complete plumbing plans along with the fee specified in s. Ind 69.23 (1) (d), shall be submitted to the department in person by appointment. The plans shall comply with all of the provisions of this section.

(4) **PLANS AND SPECIFICATIONS.** (a) At least 2 sets of plumbing plans and one copy of specifications which are clear, legible and permanent copies shall be submitted for examination and approval.

(b) If a submitter wants more than 2 sets of approved plans returned, the fees specified in Ind 69.23 shall accompany the plan submittal.

(c) All plans submitted for approval shall be accompanied by sufficient data and information for the department to judge if the plumbing and its performance will meet the requirements of this chapter and ch. ILHR 84.

1. Information to accompany the plans shall include the location or address of the plumbing installation and the name of the owner.

Note: See Appendix for further explanatory material.

2. Plans proposing the installation of a private interceptor main sewer which is to discharge to a municipal treatment facility shall:

a. Be accompanied by a letter from the appropriate designated planning or management agency indicating conformance with an approved areawide water quality management plan under ch. NR 121; and

b. Not be approved, if the municipality is ineligible for sanitary sewer extension approvals under s. NR 110.05.

3. Except as provided in subd. 4., plans proposing the installation of a building sewer for new construction which is to discharge to a municipal treatment facility shall:

a. Be accompanied by a letter from either the appropriate designated management agency or sanitary district indicating conformance with an approved areawide quality management plan; and

b. Not be approved, if the municipality is ineligible for sanitary sewer extension approvals under s. NR 110.05.

4. Plans proposing the installation of a building sewer for new construction which is to discharge to a municipal treatment facility shall not be required to comply with subd. 3., if:

a. The proposed installation is served by an existing building sewer which extends from the lot line to the public sewer; and

b. The proposed installation does not exceed the capacity of the existing building sewer or sewers.

Note: See Appendix for further explanatory material.

(d) Except as provided in par. (e), all plumbing plans and specifications shall be sealed or stamped and shall be signed by a Wisconsin regis-

tered architect, engineer or plumbing designer in accordance with ch. A-E 1.

(e) A master plumber may design and submit for approval plumbing plans and specifications for a plumbing system which the master plumber is to install. Each sheet of plans and specifications the master plumber submits shall be signed and dated and shall include the Wisconsin license number of the master plumber. Where more than one sheet is bound together into one volume, only the title sheet or index sheet need to be signed and dated by the master plumber responsible for their preparation, if the signed sheet clearly identifies all of the other sheets in the volume.

(5) **PLAN REVIEW.** Except as provided in sub. (12), the department shall review and make a determination on an application for plan review within 15 days of receiving the required information and fees.

(a) *Conditional approval.* If, upon review, the department determines that the plumbing plans substantially conform to the provisions of chs. ILHR 82 to 84, a conditional approval, in writing, shall be granted. All noncode complying conditions stated in the conditional approval shall be corrected before or during installation.

(b) *Denial of approval.* If, upon review, the department determines that the plumbing plans do not substantially conform to the provisions of chs. ILHR 82 to 84, the request of conditional approval shall be denied in writing.

(6) **EVIDENCE OF APPROVAL.** The plumber responsible for the installation of the plumbing shall keep at the construction site at least one set of plans bearing the department's or the agent municipality's stamp of approval and at least one copy of specifications. The plans and specifications shall be open to inspection by an authorized representative of the department.

(7) **FEES.** Fees for plumbing plan review and petition for variance shall be submitted in accordance with s. Ind 69.23.

Note: See Appendix for further explanatory material.

(8) **REVISIONS.** All changes or modifications, which involve the provisions of chs. ILHR 82 to 84, made to plumbing plans and specifications, which have been granted approval under sub. (1), shall be submitted to the department or agent municipality for examination. All changes and modifications shall be approved in writing by the department or agent municipality prior to installation of the plumbing.

(9) **REVOCATION OF APPROVAL.** The department may revoke any approval, issued under the provisions of this chapter, for any false statements or misrepresentation of facts on which the approval was based.

(10) **DEPARTMENT LIMITATION AND EXPIRATION OF APPROVAL.** (a) A conditional approval of a plan by the department shall not be construed as an assumption by the department of any responsibility for the design; and the department does not hold itself liable for any defects in construction, nor for any damages that may result from the specific installation.

(b) Plan approval by the department or its authorized representative shall expire 2 years after the date indicated on the approval letter, if construction has not commenced within that 2 year period.

(11) **PETITION FOR VARIANCE.** (a) *Procedure.* The department will consider and may grant a variance to an administrative rule upon receipt of a fee and a completed petition for variance form from the owner, provided an equivalency is established in the petition for variance which meets the intent of the rule being petitioned. The department may impose specific conditions in granting a variance to promote the protection of the health, safety or welfare of the public. Violation of those conditions under which the variance is granted constitutes a violation of this chapter.

(b) *Petition processing time.* Except for priority petitions, the department shall review and make a determination on a petition for variance within 30 business days of receipt of all calculations, documents and fees required to complete the review. The department shall process priority petitions within 10 business days.

(12) **ENGINEERED PLUMBING SYSTEMS.** The provisions of this chapter or ch. ILHR 84 are not intended to prevent design and use of engineered plumbing systems if the system has been first approved by the department. The department may approve an engineered plumbing system, if the system complies with the intent of chs. ILHR 82 to 84.

(a) *Plans and specifications.* Plans and specifications for all engineered plumbing systems shall be submitted and reviewed in accordance with subs. (4) to (10).

1. The plans, specifications and all pertinent data shall indicate the nature and extent of the proposed system before an approval is granted.

2. Plans, specifications and data for an engineered plumbing system shall show the complete drain system, vent system, and water supply system including:

- a. The plumbing fixture and appliance arrangements;
- b. The pipe sizes;
- c. The direction of flow for drain pipes;
- d. The grade of horizontal drain pipes;
- e. The drainage fixture unit values for all drain pipes; and
- f. The water supply fixture unit values for all water supply pipes.

3. When requested, additional details and data pertaining to the design, installations and materials of an engineered plumbing system shall be submitted to the department.

4. The department shall review and make a determination on an application for plan review of an engineered plumbing system within 3 months of receiving the required information and fees.

(b) *Inspections.* The registered architect, engineer, plumbing designer or master plumber responsible for the design of the engineered plumbing system shall provide on-site supervision of the installation.

1. Upon completion of the installation, the registered architect, engineer, plumbing designer or master plumber shall certify in writing to the department that the installation is in compliance with the approved plans, specifications and data.

2. The department may require periodic inspections of the system by the registered architect, engineer, plumbing designer or master plumber after the installation is completed to monitor the performance of the system.

(13) **PENALTIES.** Penalties for violations of this chapter shall be assessed in accordance with ss. 145.12 and 145.25 (4), Stats.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (1) (intro.), r. and recr. Tables 82.20-1 and 82.20-2, r. (5), renum. (6) to (12) to be (5) to (11), cr. (5) (intro.) and (12), Register, May, 1988, No. 389, eff. 6-1-88; correction in (1) (b) 1. made under s. 13.93 (2m) (b) 7, Stats., Register, May, 1988, No. 389.

ILHR 82.21 Testing and maintenance. (1) **TESTING OF PLUMBING SYSTEMS.** Except as provided in par. (a), all new plumbing and all parts of existing systems which have been altered, extended or repaired shall be tested as specified in par. (d) to disclose leaks and defects before the plumbing is put into operation.

(a) *Waiver of testing.* The testing of the plumbing shall not be required where the installation does not include the addition, replacement, alteration or relocation of any water distribution, drain or vent piping.

(b) *Local inspection.* Where the plumbing is installed in a municipality having a local inspector, the testing of the plumbing shall be done in the presence of a plumbing inspector, except as provided in subd. 1. b.

1. Notice of inspection. a. The plumber responsible for the installation shall notify the plumbing inspector in person, by telephone or in writing when the work is ready for inspection.

b. If the inspection is not made by the end of the normal business day following the day of notification, not including Saturday, Sunday or legal holidays, the plumber may proceed with the testing and the installation.

2. Preparations for inspection. When the installation is ready for inspection, the plumber shall make such arrangements as will enable the plumbing inspector to inspect all parts of the plumbing system. The plumber shall have present the proper apparatus and appliances for making the tests, and shall furnish such assistance as may be necessary in making the inspection.

3. Rough-in inspection. A rough-in inspection shall be made when the plumbing system is roughed-in and before fixtures are set. Except as provided in subd. 1., plumbing work shall not be closed in, concealed, or covered until it has been inspected and approved by the plumbing inspector and permission is granted to do so.

4. Final inspection. a. Upon completion of the plumbing installation and before final approval is given, the plumbing inspector shall inspect the work.

b. When required by a municipality, the plumbing installation shall be subject to a final test conducted in accordance with par. (d) 7. The final test shall be observed by the plumbing inspector.

5. Reinspections. Whenever the plumbing official finds that the work or installation does not pass any initial test or inspection, the necessary corrections shall be made to comply with this chapter. The work or installation shall then be resubmitted for inspection to the plumbing inspector.

(c) *Inspection of one-and 2-family dwellings.* The inspection of plumbing installations for one- and 2-family dwellings shall be in accordance with ss. ILHR 20.08 to 20.11.

(d) *Testing provisions.* 1. General. All plumbing shall be tested in accordance with provisions of this paragraph before being put into use.

a. Equipment, material and labor for tests. All equipment, material and labor required for testing a plumbing system or part thereof shall be furnished by the plumber responsible for the installation.

b. Exposure of work. Except as provided in subds. 2. and 5., all new, altered, extended or replaced plumbing shall be left uncovered and unconcealed until it has been tested. Where the work has been covered or concealed before it is tested, it shall be exposed for testing.

2. Building sewer and private interceptor main sewer. A building sewer and a private interceptor main sewer shall be inspected before being covered and shall be tested for leaks and defects with water or air before or after being covered in accordance with either subpar. a. or b. The test for leaks and defects may be applied to the entire building sewer or private interceptor main sewer or in sections.

a. Water test. The building sewer or private interceptor main sewer shall be tested by insertion of a test plug at the point of connection with the public sewer. The sewer shall then be filled with water under a head of not less than 10 feet. The water level at the top of the test head of water shall not drop for at least 15 minutes.

b. Air test. The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 3 pounds per square inch. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

3. Building drain. The entire building drain with all its branches, receptacles and connections shall be brought so far as practical to the surface or grade of the basement floor and shall be tested with water or air in accordance with subd. 7.

4. Drain and vent systems. The piping of a drain and vent systems, including conductors, shall be tested upon completion of the rough piping installation with water or air in accordance with subd. 7.

5. Private water mains and water services. Private water mains and water services shall be inspected before being covered. The private water mains and water services shall be tested and proven water tight under water pressure not less than the working pressure under which it is to be used. The water used for testing shall be obtained from a potable source of supply.

6. Water distribution system. The piping of a water distribution system shall be tested and proved water tight under a water pressure not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source of supply.

7. Test methods for drain and vent systems. A test for watertightness shall be applied to the entire drain and vent system at one time or to the

entire system in sections after the rough piping has been installed in accordance with either subpars. a. or b.

a. **Water test.** If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but a section shall not be tested with less than a 10 foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested, so that no joint or pipe in the building, except the uppermost 10 feet of the system, is subjected to a test of less than a 10 foot head of water. The water shall be kept in the system or in the portion under test for at least 15 minutes before inspection starts. The system shall then be tight at all points.

b. **Air test.** The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gauge pressure of 5 pounds per square inch or sufficient to balance a column of mercury 10 inches in height. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

8. **Final test.** Where required by the local plumbing inspector, after the plumbing fixtures have been installed and the traps filled with water, the connections shall be tested and proved gas and watertight by either one of the methods specified in subpars. a. or b.

a. **Smoke test.** The smoke test shall be made by introducing a pungent, thick smoke, produced by one or more smoke machines, into the completed system. When the smoke appears at stack openings on the roof, the openings shall be closed and a pressure equivalent to a one inch water column shall be built and maintained for the period of the inspection.

b. **Air test.** The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the completed system, forcing air into the system until a pressure equivalent to the gauge pressure of a one inch water column. This shall be accomplished by the use of "U" tube or manometer inserted in the trap of a water closet. The pressure shall remain constant for the period of inspection without the introduction of additional air.

(2) **MAINTENANCE AND REPAIRS.** All plumbing systems, both existing and new, and all parts thereof, shall be maintained in a safe and sanitary condition. All devices or safeguards which are required by this chapter shall be maintained in good working order. The owner shall be responsible for the maintenance of plumbing systems.

(a) *Reduced pressure principle type backflow preventers.* Reduced pressure principle type backflow preventers shall be maintained and annually tested in accordance with ASSE 1013 and its appendix.

(b) *Existing systems.* Whenever it appears upon inspection that any part of an existing plumbing system is defective, or fails to conform to the requirements of this chapter and if failure tends to create a health hazard, it shall be repaired, renovated, replaced or removed.

(c) *Fixtures replaced.* When an old or defective fixture is removed, to be replaced by a new fixture, and no other fixture or piping is to be added or

remodeled, it is not necessary to reconstruct the drain or vent piping to make it conform to the provisions of this chapter, unless the drain or vent piping is in a defective condition. Where the existing drain or vent piping does not conform to the provisions of this chapter, the department may require the new fixtures to be provided with deep seal traps.

(d) *Reconstruction*. When old or defective plumbing is to be remodeled, additional fixtures installed, or the whole plumbing system moved to another part of the building, the remodeled system shall be made to conform to this chapter.

(e) *Materials reused*. All plumbing fixtures, drain and vent pipes removed from a building, if found to be in good condition, may be reused, if the fixtures and pipes are approved by the department or local plumbing inspector and the owner of the building in which they are to be installed gives written consent.

(f) *Existing building sewers and drains*. Existing building sewers and drains may be used in connection with new buildings only when they are found on examination and test to conform to the requirements of this chapter governing building sewers and drains. If the existing work is found defective, the local or state inspector shall notify the owner of the changes necessary to make it conform to the requirements of this chapter.

(g) *Repairs*. All repairs to fixtures or piping shall be done in conformance with the provisions of this chapter, except repair clamps or bands may be used for emergency situations.

(h) *Demolition of structures*. When a structure is demolished or removed, all sanitary sewer, storm sewer and water supply connections shall be sealed and plugged in a safe manner.

(i) *Dead ends*. If a dead end is created in the removal of any part of a drain system, all openings in the drain system shall be properly sealed.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. (1) (d) 5., am. (1) (d) 7. intro., Register, May, 1988, No. 389, eff. 6-1-88; correction in (1) (c) made under s. 13.93 (2m) (b) 7, Stats., Register, May, 1988, No. 389.

Subchapter III

Drain and Vent Systems

ILHR 82.30 Sanitary drain systems. (1) **SCOPE.** The provisions of this section set forth the requirements for the design and installation of sanitary drain systems, including building drains and building sewers.

Note: The provisions for storm and clear water drain systems are specified in s. ILHR 82.36.

(2) **MATERIALS.** All sanitary drain systems shall be constructed of approved materials in accordance with ch. ILHR 84.

(3) **LOAD ON DRAIN PIPING.** (a) *Intermittent flow fixtures*. The load factor on drain piping shall be computed in terms of drainage fixture unit values specified in Table 82.30-1 for the corresponding fixture listed. Drainage fixture unit values for intermittent flow fixtures not listed in Table 82.30-1 shall be computed on the basis of one fixture unit equalling 7.5 gallons per minute of flow.

(b) *Continuous flow devices*. Drainage fixture unit values for continuous or semicontinuous flow devices such as pumps, ejectors, air conditioning

equipment or similar devices shall be computed on the basis of one fixture unit for each 2 gallons per minute of flow rate of discharge into the drain system.

Table 82.30-1
DRAINAGE FIXTURE UNIT VALUES

Type of Fixture	Drainage Fixture Unit Value (dfu)	Trap Size Minimum Diameter (in inches)
Automatic clothes washers,		
Commercial, individual.....	4	2
Commercial, large capacity.....	a	a
Self Service Laundry.....	3	1½
Residential.....	3	1½
Bathroom Group, includes: water closet, lavatory, bathtub or shower.....	6	
Bathtubs, all types ^b	2	1½
Bedpan Washer.....	6	2
Beer Tap.....	½	1½
Bidet.....	2	1½
Bottle Cooler.....	½	1½
Coffee Maker.....	½	1½
Cuspidor, fountain or dental.....	1	1½
Dipper Well.....	1	1½
Dishwasher, commercial type.....	c	c
Dishwasher, residential type.....	2	1½
Drinking Fountain.....	½	1½
Exhaust Hood Washer.....	4	2
Floor Drain,		
2 inch.....	2	2
3 inch.....	3	3
4 inch.....	4	4
Larger than 4 inch.....	4	d
Glass Filler.....	½	1½
Glass Washer.....	2	1½
Ice Chest.....	½	1½
Laundry Tray, 1 or 2 compartment.....	2	1½
Lavatory.....	1	1½
Refrigerated Food Display Case.....	1	1
Shower Stall		
Residential.....	2	2
Public, individual.....	2	2
Public, group.....	2 per shower head	2
Sinks,		
Cup.....	½	1½
Factory, wash, per set of faucets.....	1	1½
Fountain wash up, per station.....	1	1½
Fountain or Bar, 4 compartments or less.....	3	1½
Food Waste Grinder, commercial 2 HP or less.....	2	1½ or 2 ^e
Food Waste Grinder, commercial 3 HP or more.....	3	3
Laboratory.....	2	1½
Laboratory, school.....	2	1½
Classroom.....	1	1½
Pack or plaster.....	3	2
Residential, with or without food waste grinder.....	2	1½
Restaurant,		
Scullery, pots and pans - 4 compartments or less.....	4	2
Food, rinsing, cleaning or thawing.....	3	2
Service Sink, Flushing Rim.....	6	3
Service Sink, 2 inch diameter, wall outlet.....	2	2
Service Sink, 3 inch diameter, wall outlet.....	3	3
Service Sink, 2 inch diameter, floor outlet.....	2	2
Service Sink, 3 inch diameter, floor outlet.....	3	3
Shampoo Sink, barber or beauty parlor.....	2	1½
Surgeons, wash up.....	3	1½

Wash Fountain, circular and semi-circular	2	1½
Receptors of Indirect Wastes, gravity flow discharge		
1½ inch receptor outlet diameter.....	2	1½
2 inch receptor outlet diameter	3	2
3 inch receptor outlet diameter	4	3
4 inch receptor outlet diameter	6	4
larger than 4 inch receptor outlet diameter	8	f
Soda Dispenser	½	1½
Sterilizers,		
Bedpan	4	2
Garbage can washer	3	3
Instrument or water	1	1½
Urinal.....	2	2
Water Closet, nonpublic.....	4	g
Water Closet, public.....	6	g

a Based on discharge rate of the fixture.

b Includes foot, sitz and infant baths and regular bathtubs with or without showers or whirlpool circulation piping.

c Based on discharge rates and number of outlets; a 4-inch diameter trap and drain pipe minimum recommended.

d Trap size corresponds to the size of the floor drain.

e Minimum trap size corresponds to size of the fixture's tail piece as provided by the manufacturer.

f Trap size corresponds to the size of the receptor drain outlet.

g Trap size specified in referenced standards of s. ILHR 84.20 (4) (a).

(4) **SIZE OF DRAIN PIPING.** (a) *Maximum loading.* 1. The total drainage load in any portion of drain piping shall not exceed the limits specified in Tables 82.30-2 and 82.30-3.

2. The drainage fixture unit values assigned to a receptor which is to receive only the indirect waste discharge from a relief valve on a domestic water heater may be disregarded when determining the minimum size of the building drain and building sewer. Any drain piping between the receptor and the building drain shall be sized by including the assigned fixture unit values for the type of receptor.

Note: See s. ILHR 82.31 (17) for sizing requirements of combination drain and vent systems.

(b) *Minimum size of underground drain piping.* Any pipe of the drain system installed underground, other than the building sewer, shall not be less than 2 inches in diameter. Any portion of underground drain piping which is 2 inches in diameter shall not exceed a length of 20 feet.

(c) *Minimum size of building sewers.* 1. Gravity flow sewers. The minimum size of a gravity flow sanitary building sewer shall be 4 inches in diameter. A municipality or sanitary district by ordinance may require that portion of the building sewer between the lot line and the public sewer to be larger than 4 inches in diameter.

2. Pressurized sewers. a. Sewers pressurized through the use of sewage ejectors, sewage pumps or sewage grinder pumps shall be sized to maintain a minimum flow velocity of 2 feet per second and shall be in accordance with the ejector or pump manufacturer's recommendations.

b. Pressurized building sewers shall be sized not less than 2 inches in diameter for sewage ejectors and sewage pumps, and 1½ inches in diameter for all sewage grinder pumps.

(d) *Minimum size of private interceptor main sewers.* Private interceptor main sewers 6 inches or less in diameter shall not exceed the drainage

fixture unit limits specified in Table 82.30-3. Private interceptor main sewers 8 inches or larger in diameter shall comply with the design flow criteria specified in ch. NR 110.

1. One- and 2-family dwellings. a. The portion of a private interceptor main sewer serving not more than 2 one-family dwellings and the attendant garages shall not be less than 4 inches in diameter.

b. The portion of a private interceptor main sewer serving more than 2 one-family dwellings and the attendant garages shall not be less than 6 inches in diameter.

c. The portion of a private interceptor main sewer serving one 2-family dwelling and its attendant garages shall not be less than 4 inches in diameter.

d. The portion of a private interceptor main sewer serving more than one 2-family dwelling and the attendant garages shall not be less than 6 inches in diameter.

2. Public buildings. A private interceptor main sewer serving public buildings may not be less than 8 inches in diameter. A proposed private interceptor main sewer 8 inches in diameter may discharge to an existing private interceptor main sewer 6 inches or greater in diameter, if the existing private interceptor main sewer was installed prior to March 1, 1985 or was approved by the department or the department of natural resources prior to March 1, 1985. The reduction in diameter for the private interceptor main sewer shall be made in a manhole.

Note: See Appendix for further explanatory material.

(e) *Future fixtures.* Where provisions are made for the future installation of fixtures, the drainage fixture unit values of such fixtures shall be considered in determining the required sizes of drain and vent pipes. Construction to provide for future installations shall be terminated with a plugged fitting or fittings.

Table 82.30-2
HORIZONTAL AND VERTICAL DRAIN PIPING

Pipe Diameter (in inches)	Maximum Number of Drainage Fixture Units Which May Drain Through Any Portion of Horizontal and Vertical Drain Piping			
	Horizontal Drain Piping ^a	Vertical Drain Piping of 3 Branch Intervals or Less ^b	Vertical Piping in Drain Stacks of more than 3 Branch Intervals ^b	
			Total Discharge from Side Connections into One Branch Interval	Total Discharge through Any Portion
1¼	1	2	1	2
1½	3	4	2	8
2	6	10	6	24
3	20 ^c	48 ^d	20 ^c	72 ^d
4	160	240	90	500
5	360	540	200	1,100
6	620	960	350	1,900
8	1,400	2,200	600	3,600
10	2,500	3,800	1,000	5,600
12	3,900	6,000	1,500	8,400

Note a: Does not include building drains and building sewers.

Note b: Drain stacks may be reduced in size as the drainage load decreases to a minimum diameter of one half of the diameter required at the base of the stack, but not smaller than that required for a stack vent under s. ILHR 82.31 (14) (a).

Note c: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

Note d: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units within each branch interval nor more than 6 flush action type fixtures on the stack.

Table 82.30-3
BUILDING DRAINS, BUILDINGS SEWERS AND PRIVATE INTERCEPTOR MAIN SEWERS^a

Pipe Diameter (in inches)	Maximum Number of Drainage Fixture Units Which May Drain Through Any Portion of a Building Drain, Building Sewer or Private Interceptor Main Sewer			
	Pitch (inch per foot)			
	1/16	1/8	1/4	1/2
2	NP ^b	NP	6	9
3	NP	36 ^c	42 ^c	50 ^c
4	NP	180	216	250
5	NP	390	480	575
6	NP	700	840	1,000
8	1,400	1,600	1,920	2,300
10	2,500	2,900	3,500	4,200
12	2,900	4,600	5,600	6,700
15	7,000	8,300	10,000	12,000

Note a: Private interceptor main serves 6 inches or less in diameter, see s. NR 110.13 for private interceptor main sewers 8 inches or larger in diameter.

Note b: NP means Not Permitted.

Note c: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

(5) **PITCH OF HORIZONTAL DRAIN PIPING.** All horizontal drain piping 4 inches or larger in diameter shall be installed at a pitch which produces a computed velocity of at least 2 feet per second when flowing half full.

(a) *Horizontal branch drains.* 1. The minimum pitch of horizontal branch drains 2 inches or less in diameter shall be ¼ inch per foot.

2. The minimum pitch of horizontal branch drains larger than 2 inches in diameter shall be $\frac{1}{8}$ inch per foot.

(b) *Building drains and building sewers.* 1. The minimum pitch of building drains shall be in accordance with Table 82.30-3.

2. a. The minimum pitch of building sewers 10 inches or less in diameter shall be in accordance with Table 82.30-3.

b. The minimum pitch of building sewers 12 inches or larger in diameter shall conform with the minimum pitches specified for municipal sewers in s. NR 110.13 (2) (c).

(c) *Private interceptor main sewers.* 1. The minimum pitch of private interceptor main sewers 6 inches or less in diameter shall be in accordance with Table 82.30-3.

2. The minimum pitch of private interceptor main sewers 8 inches or larger in diameter shall conform with the minimum pitches specified for municipal sewers in s. NR 110.13 (2) (c).

(6) **OFFSETS IN VERTICAL DRAINS.** Offsets in vertical drain piping shall be in accordance with this subsection.

(a) *Offsets of 45° or less.* 1. An offset in a vertical drain, with a change in direction of 45° or less from the vertical, shall be sized as a vertical drain piping in accordance with sub. (4).

2. Where a horizontal branch connects to a stack within 2 feet above or below an offset with a change of direction of 30 to 45° from the vertical and the offset is located below 2 or more branch intervals, a relief vent shall be installed in accordance with s. ILHR 82.31 (5).

(b) *Offsets of more than 45°.* A drain stack with an offset of more than 45° from the vertical shall be installed in accordance with subds. 1. to 5.

1. That portion of the stack above the highest offset fitting shall be sized as for vertical drain piping in accordance with sub. (4).

2. That portion of the offset between and including the offset fittings shall be sized as horizontal drain piping in accordance with sub. (4).

3. That portion of stack below the offset shall be not less than the size of the offset and not less than the size required for vertical drain piping in accordance with sub. (4).

4. No horizontal branch drain may connect to the stack offset downstream from the offset's highest fitting within the distance equal to 10 pipe diameters of the offset.

5. Where an offset is located below 2 or more branch intervals, a relief vent and a yoke vent shall be installed in accordance with s. ILHR 82.31 (5).

Note: See Appendix for further explanatory material.

(7) **HORIZONTAL BRANCH DRAIN CONNECTION AT BASE OF A STACK.** (a) A horizontal branch drain shall not connect to a building drain downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 10 pipe diameters of the building drain.

(b) A combination drain and vent branch shall not connect to a building drain downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 20 pipe diameters of the building drain.

Note: See Appendix for further explanatory material.

(8) **PIPING CHANGES IN DIRECTION.** Changes in the direction of drain piping shall be accomplished in accordance with the requirements of this subsection.

(a) *Fittings.* All changes in direction of flow in drain piping shall be made by the appropriate use of 45 degree wyes, long or short sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or other equivalent fittings. Except as provided in subds. 1. to 3., fittings which change the direction of flow for drain piping 8 inches or less in diameter shall conform to the minimum radii specified in Table 82.30-4.

Note: See Appendix for further explanatory material.

1. The minimum radius for the first 90° fitting downstream from a trap serving a lavatory or sink shall be 1-3/4 inches for drain piping 1-1/2 inches in diameter. The fitting shall be a tee or quarter bend.

2. The minimum radius for the first 90° bend or elbow downstream from a water closet shall be 2-1/2 inches for drain piping 3 inches in diameter.

3. The minimum radius for the first 90° bend or elbow downstream from a water closet shall be 3 inches for drain piping 4 inches in diameter.

Table 82.30-4
MINIMUM RADII OF FITTINGS
(in inches)

Diameter of pipe (in inches)	Changes in Direction of Flow	
	Horizontal to Vertical	Vertical to Horizontal and Horizontal to Horizontal
1-1/4	1-1/8	2-1/4
1-1/2	1-3/8	2-3/4
2	1-7/8	3-1/4
3	2-7/8	4-1/16
4	3-3/4	4-7/8
5	4-1/2	6-1/2
6	5	7
8	6	8

(b) *Blowout type fixtures.* Where blowout type fixtures are installed back to back, appropriate fittings shall be installed to prevent the passage of wastes from one fixture to the other.

(9) **DRAIN FITTINGS AND CONNECTIONS.** Drain fittings, connections, devices and methods of installation shall not obstruct or retard the flow of water, wastes, sewage or air in the drain system or venting system in an amount greater than the normal frictional resistance to flow, unless as otherwise permitted in this chapter or unless approved by the department.

(a) *Closet bend.* The reduction of a 4 × 3 inch closet bend or collar fitting from 4 inches to 3 inches shall not be considered an obstruction.

(b) *Side inlet tees or bends.* The side inlet of a low pattern or high pattern tee or bend shall not be used as a vent connection when the side inlet is placed in a horizontal position or when any arrangement of piping or fittings produces a similar effect.

Note: See Appendix for further explanatory material.

(c) *Prohibited fittings and connections.* The types of fittings and connections specified in subds. 1. to 4. shall not be used for drain piping:

1. A heel inlet bend when the heel inlet is in the horizontal position;
2. A fitting or connection which has an enlargement chamber or recess with a ledge or shoulder, or reduction in pipe area in the direction of flow;
3. A fitting which has running threads; and
4. A connection by means of drilling and tapping of a drain or vent pipe, unless as otherwise approved by the department.

(d) *Saddles.* If a pipe saddle is used to connect drain piping together, the saddle shall be installed in accordance with s. ILHR 84.30 (5) (d).

(10) **SUMPS, EJECTORS AND PUMPS.** (a) *Sumps.* 1. General. All sanitary building subdrains shall discharge into an approved, vented sump with an airtight cover. The sump shall be so located as to receive the sewage by gravity flow, and shall be located at least 25 feet from any water well.

2. Capacity. The minimum capacity of the sump shall be determined in accordance with the provisions of subpars. a. to e.

a. The water supply fixture unit method shall be used to determine peak input flow in gallons per minute; only the fixtures that drain to the sump shall be included.

Note: When converting water fixture units to gallons per minute it is permissible to calculate the load as a supply system with predominantly flush tanks.

b. The capacity of the sump shall be such that the pump when actuated by the lowest "pump on" switch runs at least 20 seconds.

c. Between the highest "pump on" switch level and the sump inlet, the sump shall hold the amount of input that exceeds the discharge of the pumping equipment in a 5 minute peak input period, but in no case shall the vertical distance between the switch and the inlet be less than 3 inches.

d. The low water level shall be maintained in accordance with the pump manufacturer's requirements, but shall not be less than 4 inches above the sump bottom.

e. Minimum sump diameter. Sumps containing one pump shall have an inside diameter of at least 24 inches. Sumps containing 2 pumps shall have an inside diameter of at least 30 inches.

Note: See Appendix for further explanatory material.

3. Vents. All sumps and all drains leading to a sump shall be vented in accordance with s. ILHR 82.31.

4. Materials. All sumps shall be constructed in a watertight manner of approved materials in accordance with ch. ILHR 84.

(b) *Ejectors and pumps.* 1. Where required. The liquid from all sanitary building sumps shall be lifted and discharged into the building sanitary drain system by automatic ejectors, pumps or any other equally efficient method approved by the department.

2. Duplex equipment. a. Public buildings. Duplex ejector or pumping equipment shall be installed in a public building where 3 or more water closets or more than 20 drainage fixture units discharge into a sump.

b. One- and 2-family dwellings. Duplex ejector or pumping equipment shall be installed where the sanitary wastes of 2 or more one- or 2-family dwellings discharge into a sump.

c. Operation. Where duplex ejector or pumping equipment is installed, appropriate devices shall be installed to automatically alternate operation of the pumps or ejectors and to operate both pumps or ejectors when one unit cannot handle the load.

3. Size. The size and design of an ejector or pump shall be determined by the capacity of the sump to be served, the discharge head and discharge frequency. All ejectors and pumps shall provide a minimum flow velocity of 2 feet per second in the forced discharge piping.

Note: Ejectors or pumps discharging to septic tanks may disturb the normal settling properties of the tank environment; contact the bureau of plumbing for more information.

a. Sewage grinder pumps. All sewage grinder pumps shall have a minimum $1\frac{1}{4}$ inch diameter discharge opening and discharge piping.

b. Nongrinder-type sewage pumps. All nongrinder-type sewage pumps serving water closets shall be capable of passing a 2 inch diameter solid ball and shall have a minimum 2 inch diameter discharge opening and discharge piping. All other pumps handling sanitary wastes shall be rated by the manufacturer as an effluent pump, shall be capable of passing a $\frac{1}{2}$ inch diameter solid ball and shall have a minimum $1\frac{1}{4}$ inch diameter discharge opening and discharge piping.

4. Discharge connections. a. The discharge pipe from the ejector or pump shall be connected to the gravity drain by means of a wye pattern fitting. Where the fitting connects to a horizontal drain, the bottom of the wye branch of the fitting shall be located above the horizontal center line.

b. A full flow check valve shall be installed in the discharge piping from each ejector or pump.

c. Where duplicate ejector or pumping equipment is installed, each discharge pipe from an ejector or pump shall be provided with a gate or ball type valve installed downstream of each full flow check valve.

5. Discharge pipe air relief. Air relief valves shall be provided at all high points in the discharge piping of an ejector or pump where the piping arrangement creates an air trap.

6. Prohibited connections. No fixtures may be connected to the discharge pipe between the ejector or pump and the point where it enters the gravity drain.

7. Maintenance. All ejectors, pumps and like appliances shall receive care as needed to keep them in a satisfactory operating condition.

(11) **BUILDING DRAINS AND BUILDING SEWERS.** The interior drain system or systems of each building shall be entirely separate and independent of any other interior drain system serving another building. All sanitary building sewers, storm building sewers, or other special type building sewers shall discharge to a public sewer, private interceptor main sewer or private sewage system. No building sewer may pass through or under a building to serve another building.

(a) *Building drains.* 1. Elevation. a. All building drains shall be installed below the lowest floor levels on which fixtures may be installed if the public sewer, septic tank or private interceptor main sewer elevation permits.

b. A building drain serving only dwelling units may be located above ground in order to discharge to the building sewer by means of gravity flow. No above ground building drain may be located above the floor of the first story.

c. Where any portion of an above-ground building drain discharges to a vertical pipe, the building drain shall connect to the building sewer at an elevation at least 30 inches above the basement floor.

Note: See Appendix for further explanatory material.

2. Backwater protection. A building drain subject to backflow or backwater shall be protected with a backwater valve or with a sump with pumping equipment in accordance with sub. (10).

a. Backwater valves, when fully open, shall have a capacity not less than that of the pipes in which installed.

b. Backwater valves shall be so located as to be readily accessible for cleaning.

3. Floor drain required. Where a plumbing fixture or appliance is located on a floor which is entirely below grade, a floor drain shall be installed to serve that floor.

(b) *Building sewers.* 1. Minimum depth. a. The top of a building sewer shall be located at a depth of not less than 42 inches below finished grade, except as provided in subpar. b. or as approved by the department.

b. The top of a building sewer which discharges to a septic tank, holding tank or grease interceptor shall be located at a depth of not less than 18 inches below finished grade.

2. Protection from frost. a. Except as provided in subpars. c. and d., a building sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer is located less than 60 inches below a surface area from which snow will be cleared.

b. Except as provided in subpars. c. and d., a building sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer is located less than 42 inches below a surface which snow will not be cleared.

c. Where a building sewer discharges to a septic tank, holding tank, or grease interceptor, the portion of a building sewer which is within 30 feet from the connecting building drain and which is under a surface area

from which snow will not be cleared shall not be required to be protected from frost.

d. Frost protection for a building sewer shall not be required where the predicted depth of frost as determined from Figure 82.30-1 and Table 82.30-6 does not extend below the top of the building sewer.

3. Insulations for building sewers. Where required by subd. 2. a. or 2. b., building sewer insulation for frost protection shall be provided in accordance with one of the methods specified in subpars. a. to c.

a. Extruded polystyrene. Extruded polystyrene foam insulation shall be installed at a depth of at least 18 inches below finished grade and at least 6 inches above the top of the sewer pipe. The minimum thickness and width of the foam insulation shall be determined from Figure 82.30-1 and Tables 82.30-5 to 82.30-7. If the insulation is to be installed more than 6 inches above the top of the sewer, the number of inches exceeding 6 inches shall be added to the width of insulation determined from Table 82.30-7.

b. Insulating concrete. Lightweight insulating concrete shall be installed to the depth of the spring line of the sewer and shall extend laterally at least 6 inches on both sides of the sewer. The minimum thickness of the insulating concrete shall be determined from Figure 82.30-1 and Table 82.30-5. The thickness shall be measured from the top of the sewer. The top of the insulation shall be installed at least 12 inches below finished grade.

c. Alternative methods. Alternative methods of frost protection shall be approved by the department.

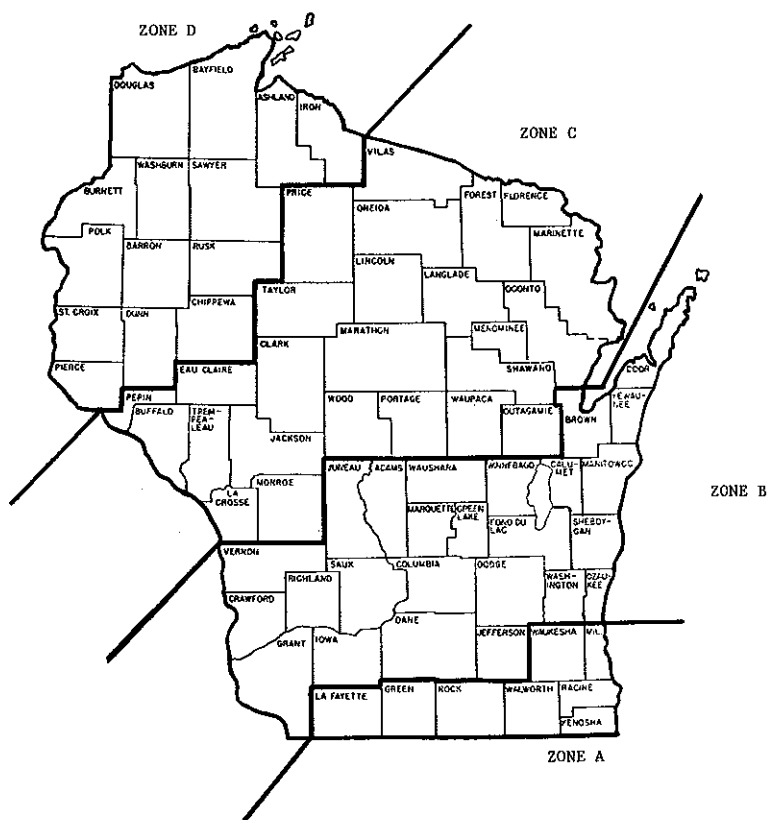


Table 82.30-5
MINIMUM THICKNESS OF INSULATION

Installation Site Zone	Extruded Polystyrene Foam (in inches)	Insulating Concrete (in inches)
A	1.0	6
B	1.5	9
C	2.0	12
D	2.5	15

Table 82.30-6
PREDICTED DEPTH OF FROST IN VARIOUS TYPES OF BACKFILL SOIL
(in feet)

Soil Type	Installation Site Zone			
	A	B	C	D
Clay, Clay Loam	2.5	3.0	3.5	4.0
Silt Loam, Silty Clay Loam	3.5	4.0	4.5	5.5
Sandy Clay Loam	4.0	4.5	5.5	6.0
Sandy Loam, Loamy Sand	4.5	5.0	6.0	6.5
Sand	5.0	5.5	6.5	7.5
Gravelly Sand	6.0	7.5	9.0	10.0

Table 82.30-7
MINIMUM WIDTH OF EXTRUDED POLYSTYRENE FOAM INSULATION
(in feet)

Predicted Depth of of Frost (in feet)	Depth of Sewer (in feet)					
	2.0	2.5	3.0	3.5	4.0	4.5
2.5	2	NR				
3.0	3		NR			
3.5	4	3		NR		
4.0	5	4	3	2	NR	
4.5	6	5	4	3	2	NR
5.0	7	6	5	4	3	2
5.5	8	7	6	5	4	3
6.0	9	8	7	6	5	4
6.5	10	9	8	7	6	5
7.0	10	10	9	8	7	6
7.5	10	10	10	9	8	7
8.0	10	10	10	10	9	8
8.5	10	10	10	10	10	9
9.0	10	10	10	10	10	10
10.0	10	10	10	10	10	10

Note: NR means Not Required.

(c) *Location limitations.* Building drains and building sewers shall be separated from water wells by the following minimum distances:

1. Eight feet for building drains and building sewers of cast iron pipe;
2. Eight feet for building drains and building sewers of plastic pipe;
3. Twenty-five feet for building drains and building sewers of all other materials; and
4. Twenty-five feet for all pressurized building drains and building sewers.

Note: See s. ILHR 82.40 for provisions regarding the separation of water supply piping and building sewer piping.

(d) *Installation of building drains and building sewers.* 1. Trenching. All excavations for building drains and building sewers shall be open trench

work, unless otherwise permitted by local ordinance or accepted by the local inspector.

2. Stable bottom. Where the bottom of the trench can be maintained in a stable condition and free of water during the time of installation the building drain and the building sewer shall be bedded and initially back-filled as specified in this subdivision. Grade, as used in this subdivision, shall mean the elevation of the bottom of the building drain or the building sewer.

a. Concrete, clay, plastic and asbestos-cement pipe. Except where sand is encountered, the trench bottom throughout its length shall be excavated to a depth at least 3 inches below the grade elevation and shall be brought back to grade with sand, pea gravel, or a graded stone bedding. The bedding material shall be of a size that all the material shall pass a $\frac{3}{4}$ inch sieve. When sand is used as a bedding material it shall not contain excessive moisture and the bedding in the entire trench width shall be hand or mechanically tamped to compact it to a minimum of 90% Standard Proctor Density. All bedding shall be shaped to accommodate pipe bells or couplings. Initial backfill on the sides of the pipe and to a depth of 12 inches over the pipe shall be sand, gravel, crushed stone or excavated material which is neither corrosive nor organic in nature. A concrete floor may be placed over a building drain having less than 12 inches of initial backfill. Initial backfill material shall be of a size that all the material shall pass a one inch sieve. Initial backfill material shall be placed in increments not exceeding 6 inches in depth and shall be well tamped for the full width of the trench and for the full length of the sewer.

b. Cast iron pipe. Where the trench bottom does not contain stone larger than one inch in size or where bedrock is not encountered, the trench may be excavated to grade. Where stone larger than one inch in size or when bedrock is encountered, the trench shall be excavated to a depth at least 3 inches below the grade elevation and shall be brought back to grade with a bedding of sand, gravel, or crushed stone which shall be of a size that all the material shall pass a $\frac{3}{4}$ inch sieve. The bedding material shall be shaped to accommodate the pipe bells or couplings. Initial backfill on the sides of the pipe and to a depth of 3 inches over the pipe for that part of the pipe laid on private property shall be well tamped sand, gravel, crushed stone or excavated material which is neither corrosive nor organic in nature. A concrete floor may be placed over a building drain having less than 3 inches of initial backfill. Initial backfill material shall be of a size that all the material shall pass a one inch sieve. For that portion of the sewer in the street right of way, the initial backfill material to a depth of 12 inches over the pipe shall be sand, gravel or crushed stone which shall be of a size that all the material shall pass a one inch sieve. Initial backfill material shall be placed in increments not exceeding 6 inches and shall be well tamped.

3. Unstable bottom. Where a mucky or unstable bottom is encountered in the trench, the required dry and stable foundation conditions shall be provided by sheathing driven and left in place to a depth of 48 inches below the trench bottom or to solid foundation at a lesser depth, the removal of wet and yielding material to a depth of 24 inches or to solid material, and replacement of the unstable material with limestone screenings, pea gravel or equivalent material for the bedding under the pipe. The trench bedding shall be shaped to accommodate pipe bells or

couplings. In lieu of the foregoing, the required dry and stable foundation conditions may be provided by installation of a longitudinally reinforced concrete cradle the width of the trench and at least 3 inches thick or by installation of a longitudinally reinforced concrete slab the width of the trench at least 3 inches thick and bedding material as provided for in subd. 2. Initial backfill material and its placement shall conform to that specified in subd. 2. All sheathing shall be cut off at a depth of 3 feet or more below the ground surface to prevent heaving due to frost action.

4. Backfill completion. Care shall be exercised in placing the balance of the backfill to prevent breakage of the pipe. Large boulders or rock, concrete slabs, or frozen masses shall not be used in the backfill. At least 36 inches of backfill cover shall be provided over the top of the pipe before the pipe trench is wheel-loaded.

5. Pipe openings protected. The ends of all pipes not immediately connected shall be closed so as to prevent the introduction of earth or drainage from an excavation.

(e) *Connection to public sewer.* The connections of building sewers to public sewers shall be in accordance with conditions of approval for the public sewer granted by the department of natural resources under s. 144.04, Stats.

1. Gravity public sewer. When a building sewer connection to the public sewer is not found within 3 feet of the point designated by the local governing body or its authorized representative, the connection shall be made in accordance with one of the provisions specified in subpars. a. to d.

a. A saddle fitting approved by the department and acceptable to the municipality or sanitary district shall be installed.

b. Where acceptable to the municipality or sanitary district a portion of the main sewer may be removed and a tee or wye fitting approved by the department may be inserted with compression joints in the public sewer acceptable to the municipality or the sanitary district. The insertion shall be made under the supervision of the authorized representative of the municipality or the sanitary district.

c. When the public sewer is concrete or clay, the end of the connecting sewer may be set upon or in an opening cut into the top half of the public sewer, but shall not protrude into the public sewer. The connection shall be secured by encasing the main sewer pipe and the connection in concrete at least 3 inches thick so as to assure permanency of the connection and adequate backing of the public sewer pipe.

d. In lieu of the use of a fitting and in the event that an opening cannot be located in the top half of the public sewer, a length of concrete or clay public sewer pipe may be removed and a section with a wye fitting shall be inserted in its place. The joints at the ends of the section shall be encased in concrete at least 3 inches thick. The connection or insertion shall be made under the supervision of the authorized representative of the municipality or the sanitary district.

2. Pressurized public sewer. Where a forced building sewer discharges to a pressurized public sewer, a full flow corporation cock, full flow curb stop, check valve and dresser type coupling shall be installed. The curb stop, check valve and dresser type coupling shall be installed on the

property as close as possible to the connection to the common forced main sewer. The check valve and dresser type coupling shall be accessible.

Note: See Appendix for further explanatory material.

(f) *Prohibited installations.* 1. Harmful discharge. No person may connect to a public sewer any building drain or building sewer through which is discharged any substance likely to cause undue corrosion, obstruction, nuisance, explosion or interference with sewage treatment processes.

2. Storm and clear water connections. Storm drain piping and clear water drain piping may not discharge to a sanitary building drain or to a private sewage system.

Note: See s. ILHR 82.36 for provisions relative to storm sewers.

(12) PRIVATE INTERCEPTOR MAIN SEWERS. (a) The connection of a private interceptor main sewer to a public sewer shall be in accordance with the conditions of approval for the public sewer granted by the department of natural resources under s. 144.04, Stats.

(b) Private interceptor main sewers which discharge to a municipal treatment facility shall be designed in accordance with the appropriate water quality management plan.

(c) All private interceptor main sewers shall be tested in accordance with s. ILHR 82.21.

(d) Private interceptor main sewers 6 inches or less in diameter shall be installed in accordance with the criteria for building sewers specified in sub. (11) (b) and (c) and (d) and (e).

(e) Private interceptor main sewers 8 inches or larger in diameter shall be:

1. Provided with frost protection in accordance with sub. (11) (b); and
2. Installed in accordance with the municipal sewer criteria specified in s. NR 110.13.

(13) LOCATION OF DRAIN PIPING. (a) Drain piping located below the ceilings of areas where food, ice or potable liquids are prepared, handled, stored or displayed shall be installed with the least number of joints and shall be installed in accordance with subs. 1. to 5.

1. All pipe openings through floors shall be provided with sleeves bonded to the floor construction and protruding not less than one inch above the top of the finish floor with the space between sleeve and the piping sealed.

2. Plumbing fixtures, except bathtubs and showers, shall be of the wall mounted type. Bathtubs shall have waste and overflow connections made above the floor and piped to a trap below the floor.

3. Floor and shower drains installed shall be equipped with integral seepage pans.

4. Cleanouts for piping shall be extended through the floor construction above.

5. Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.

(b) Where drain piping is located in ceilings of areas where food, ice or potable liquids are prepared, handled stored or displayed, the ceilings shall be of the removable type, or shall be provided with access panels in order to provide an access for inspection of the piping.

(c) Exposed drain piping shall not be located over a pool, surge tank or an open filter for a pool.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. Table 82.30-1, (8) (a), (9) (c) (intro.) and 3., and (10) (b) 3. b., r. and recr. (4) (d) 2., Table 82.30-4, (10) (a) 2. b., (11) (intro.) and (f) 2., cr. (8) (a) 1. to 3. and (9) (d), r. (9) (c) 4., renum. (9) (c) 5. to be 4. and am., Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 82.31 Vents and venting systems. (1) **SCOPE.** The provisions of this section set forth the requirements for the design and the installation of vents and venting systems.

(2) **MATERIALS.** All vents and venting systems shall be constructed of approved materials in accordance with ch. ILHR 84.

(3) **GENERAL.** (a) *Vents.* Every trap and trapped plumbing fixture shall be provided with an individual vent, except as otherwise permitted in this chapter. Vents and venting systems shall be designed and installed so that the water seal of a trap shall be subject to a maximum pneumatic pressure differential equal to one inch of water column.

(b) **MAIN STACK.** Each gravity-flow sanitary building sewer shall be served by at least one stack which extends from a building drain to a vent terminal or vent header. The stack shall be not less than 3 inches in diameter from the building drain to the vent terminal or vent header.

(4) **VENT STACKS AND STACK VENTS.** (a) *Where required.* Where individual vents, relief vents, or other branch vents are required, a vent stack and a stack vent shall be installed to serve all drain stacks of 2 or more branch intervals.

(b) *Installation.* 1. The connection of the vent stack to a drain stack shall be at or below the lowest branch drain connection to the drain stack. The connection to the drain stack shall be by means of a wye pattern fitting installed in a vertical portion of the stack.

2. A vent stack and a stack vent shall:

a. Extend to a vent terminal in accordance with sub. (16);

b. Connect to a vent stack which extends to a vent terminal; or

c. Connect to a stack vent at least 6 inches above the flood level rim of the highest fixture discharging into a drain stack.

3. Vent stacks and stack vents may connect into a common vent header and then shall extend to a vent terminal.

Note: See Appendix for further explanatory material.

(5) **RELIEF AND YOKE VENTS FOR STACK OFFSETS.** (a) *Offsets of 30 to 45°.* Where a horizontal branch drain connects to a drain stack within 2 feet above or below a stack offset with a change of direction of 30 to 45° from the vertical and the offset is located below 2 or more branch intervals, a

relief vent shall be installed in accordance with par. (c), except where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the offset of 30 to 45 degrees.

(b) *Offsets of more than 45°.* Except as provided in subds. 1. and 2., where a drain stack has an offset of more than 45° from the vertical located below 2 or more branch intervals, a relief vent and a yoke vent shall be installed in accordance with par. (c).

1. Where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the lower stack offset, the installation of a yoke vent shall not be required.

2. Where the offset of more than 45° is located below the lowest branch drain connection, the installation of the relief vent shall not be required.

(c) *Installation.* 1. Relief vent. a. A relief vent serving a drain stack offset shall be installed as a vertical continuation of the portion of the stack below the offset or as a side connection to the portion of the stack below the offset. No drain connection may be installed between the offset and the side connection of the relief vent.

b. The connection of the relief vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of the relief vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

2. Yoke vent. a. A yoke vent serving a drain stack offset shall connect to the drain stack at or below the lowest branch drain connection to the portion of the drain stack above the offset.

b. The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of the yoke vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

Note: See Appendix for further explanatory material.

(6) **YOKE VENTS FOR STACKS OF MORE THAN 10 BRANCH INTERVALS.** Drain stacks of more than 10 branch intervals shall be provided with yoke vents.

(a) Yoke vents shall be installed not more than 10 branch intervals apart nor more than 10 branch intervals from the top or bottom of the drain stack.

(b) The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

(c) The connection of the yoke vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

(7) **RELIEF VENTS FOR BUILDING DRAINS.** A building drain with a change in elevation of 12 feet or more and at an angle of 45° or more from the horizontal shall be provided with a relief vent.

5. Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.

(b) Where drain piping is located in ceilings of areas where food, ice or potable liquids are prepared, handled stored or displayed, the ceilings shall be of the removable type, or shall be provided with access panels in order to provide an access for inspection of the piping.

(c) Exposed drain piping shall not be located over a pool, surge tank or an open filter for a pool.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. Table 82.30-1, (8) (a), (9) (c) (intro.) and 3., and (10) (b) 3. b., r. and recr. (4) (d) 2., Table 82.30-4, (10) (a) 2. b., (11) (intro.) and (f) 2., cr. (8) (a) 1. to 3. and (9) (d), r. (9) (c) 4., renum. (9) (c) 5. to be 4. and am., Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 82.31 Vents and venting systems. (1) **SCOPE.** The provisions of this section set forth the requirements for the design and the installation of vents and venting systems.

(2) **MATERIALS.** All vents and venting systems shall be constructed of approved materials in accordance with ch. ILHR 84.

(3) **GENERAL.** (a) *Vents.* Every trap and trapped plumbing fixture shall be provided with an individual vent, except as otherwise permitted in this chapter. Vents and venting systems shall be designed and installed so that the water seal of a trap shall be subject to a maximum pneumatic pressure differential equal to one inch of water column.

(b) **MAIN STACK.** Each gravity-flow sanitary building sewer shall be served by at least one stack which extends from a building drain to a vent terminal or vent header. The stack shall be not less than 3 inches in diameter from the building drain to the vent terminal or vent header.

(4) **VENT STACKS AND STACK VENTS.** (a) *Where required.* Where individual vents, relief vents, or other branch vents are required, a vent stack and a stack vent shall be installed to serve all drain stacks of 2 or more branch intervals.

(b) *Installation.* 1. The connection of the vent stack to a drain stack shall be at or below the lowest branch drain connection to the drain stack. The connection to the drain stack shall be by means of a wye pattern fitting installed in a vertical portion of the stack.

2. A vent stack and a stack vent shall:

- a. Extend to a vent terminal in accordance with sub. (16);
- b. Connect to a vent stack which extends to a vent terminal; or
- c. Connect to a stack vent at least 6 inches above the flood level rim of the highest fixture discharging into a drain stack.

3. Vent stacks and stack vents may connect into a common vent header and then shall extend to a vent terminal.

Note: See Appendix for further explanatory material.

(5) **RELIEF AND YOKE VENTS FOR STACK OFFSETS.** (a) *Offsets of 30 to 45°.* Where a horizontal branch drain connects to a drain stack within 2 feet above or below a stack offset with a change of direction of 30 to 45° from the vertical and the offset is located below 2 or more branch intervals, a

relief vent shall be installed in accordance with par. (c), except where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the offset of 30 to 45 degrees.

(b) *Offsets of more than 45°.* Except as provided in subds. 1. and 2., where a drain stack has an offset of more than 45° from the vertical located below 2 or more branch intervals, a relief vent and a yoke vent shall be installed in accordance with par. (c).

1. Where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the lower stack offset, the installation of a yoke vent shall not be required.

2. Where the offset of more than 45° is located below the lowest branch drain connection, the installation of the relief vent shall not be required.

(c) *Installation.* 1. Relief vent. a. A relief vent serving a drain stack offset shall be installed as a vertical continuation of the portion of the stack below the offset or as a side connection to the portion of the stack below the offset. No drain connection may be installed between the offset and the side connection of the relief vent.

b. The connection of the relief vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of the relief vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

2. Yoke vent. a. A yoke vent serving a drain stack offset shall connect to the drain stack at or below the lowest branch drain connection to the portion of the drain stack above the offset.

b. The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of the yoke vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

Note: See Appendix for further explanatory material.

(6) **YOKE VENTS FOR STACKS OF MORE THAN 10 BRANCH INTERVALS.** Drain stacks of more than 10 branch intervals shall be provided with yoke vents.

(a) Yoke vents shall be installed not more than 10 branch intervals apart nor more than 10 branch intervals from the top or bottom of the drain stack.

(b) The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

(c) The connection of the yoke vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

(7) **RELIEF VENTS FOR BUILDING DRAINS.** A building drain with a change in elevation of 12 feet or more and at an angle of 45° or more from the horizontal shall be provided with a relief vent.

(a) The connection of the relief vent to the building drain shall be by means of a wye pattern fitting installed within 2 feet upstream of the top of the change in elevation.

(b) The connection of the relief vent to another vent shall be not less than 42 inches above the next higher floor level where plumbing fixtures are installed that discharge through the building drain.

Note: See Appendix for further explanatory material.

(8) VENTS FOR SANITARY SUMPS. Sanitary sumps shall be provided with a vent connecting either to the sump above the drain inlet or to the drain inlet within 12 inches of the sump.

(9) FIXTURE VENTS. (a) *Developed length between vent and trap.* Each fixture trap shall be protected with a vent located in accordance with the provisions of subds. 1. and 2.

1. Each fixture trap which is not an integral part of the fixture shall be protected with a vent so located that the developed length of the fixture drain piping from the trap weir to the vent connection is within the limits set forth in Table 82.31-1.

2. Each fixture trap which is an integral part of the fixture shall be protected with a vent so located that the developed length of the fixture drain piping from fixture outlet to the vent connection is within the limits set forth in Table 82.31-1. For a floor outlet water closet or similar fixture, the point where the fixture drain piping turns horizontal shall be considered as the fixture outlet.

(b) *Minimum distance.* A vent shall not connect to a fixture drain within the distance equal to 2 diameters of the drain piping from the weir of a trap.

Note: See Appendix for further explanatory material.

Table 82.31-1
MAXIMUM DEVELOPED LENGTH BETWEEN VENT AND TRAP
(in feet)

Diameter of Fixture Drain ^a (in inches)	Vent Connecting to Horizontal Drain Piping	Vent Connecting to Vertical Drain Piping								
		by means of a Sanitary Tee Fitting						by means of a Wye Pattern Fitting ^b		
		Pitch of Fixture Drain (inch per foot)			Pitch of Fixture Drain (inch per foot)			Pitch of Fixture Drain (inch per foot)		
		½	¼	⅓	½	¼	⅓	½	¼	⅓
1½	NP ^c	5.0	2.5	NP	3.5	2.0	NP	1.5	1.0	
1½	NP	6.0	3.0	NP	5.0	3.0	NP	4.0	2.0	
2	NP	8.0	4.0	NP	6.0	4.0	NP	4.5	4.0	
3	24	12.0	6.0	10.0	8.0	6.0	8.0	6.0	6.0	
4 ^d	32	16.0	8.0	12.0	10.0	8.0	10.0	8.0	8.0	

Note a: Diameters to be selected on the basis of the smallest drain pipe installed downstream from the trap serving a particular fixture.

Note b: The wye pattern fitting refers to a tee-wye fitting, a combination wye and eighth bend fitting or a wye and eighth bend combination of fittings with no more than one inch between the wye fitting and eighth bend fitting.

Note c: NP means Not Permitted.

Note d: The maximum developed length for fixture drains larger than 4 inches in diameter shall be approved by the department.

(10) **CIRCUIT VENTING.** In lieu of providing individual vents, a horizontal drain to which at least 2 but not more than 8 similar floor outlet fixtures, other than blowout type water closets, are connected in battery, may be vented by a circuit vent in accordance with pars. (a) to (e). For the purposes of this subsection flush action type floor outlet fixtures of 4 or more drainage fixture units shall be considered as one group of similar fixtures; all other types of floor outlet fixtures shall be considered as another group of similar fixtures.

(a) The circuit vent shall connect to the horizontal drain at a point between the 2 most upstream, floor outlet fixtures.

(b) 1. A circuit vented horizontal drain into which 4 or more floor outlet fixtures discharge shall be provided with a relief vent, unless the horizontal drain connects to a drain stack with no other drain connections located above the circuit vented horizontal drain. The relief vent shall connect to the circuit vented horizontal drain downstream of the most downstream fixture drain which is vented by the circuit vent and upstream of any other drain connections.

2. Two circuit vented horizontal drains serving a total of 8 fixtures, 4 on each branch, shall be provided with at least one relief vent, unless the horizontal drains connect to a drain stack with no other drain connections located above the circuit vented horizontal drains. One relief vent may serve both horizontal drains, if installed downstream of the point where the 2 horizontal drains are joined.

Note: See Appendix for further explanatory material.

(c) A horizontal drain served by a circuit vent shall not diminish in size from the connection to the drain stack to the circuit vent connection. Where a relief vent is installed, the horizontal drain served by the circuit vent shall not diminish in size from the relief vent connection to the circuit vent connection.

(d) Fixture drains served by a circuit vent shall conform to the provisions of sub. (9). The connection of the fixture drain to the branch drain served by the circuit vent shall be considered as the vent connection.

(e) Only wall outlet fixtures with a drainage fixture unit value of one or less which are served by individual vents or common vents may discharge into a horizontal drain served by a circuit vent.

(11) **COMMON VENTS.** In lieu of providing individual vents, fixtures may be common vented in accordance with pars. (a) and (b).

(a) *Vertical drains.* A common vent may serve 2 fixture traps where both fixture drains connect to a vertical drain at the same elevation. Where this connection is by means of a sanitary tee fitting with a side inlet, the centerline of the side inlet opening may not be below the centerline of the larger opening. The drain connection of a blowout type fixture or a kitchen sink served by a common vent may not be by means of a double sanitary tee fitting.

(b) *Horizontal branches.* The fixture drains from 2 wall-outlet fixtures, each with a drainage fixture unit value of one or less, or the fixture drains from 2 traps serving a kitchen sink with or without a dishwasher may connect to a horizontal branch without individual vents provided a common vent connects to the branch drain downstream of both fixture

drains. Both fixture drains shall be of the same diameter. The developed length of the drain from the vent to the farthest trap shall conform to sub. (9).

(12) ISLAND FIXTURE VENTING. Island plumbing fixtures may be vented in accordance with pars. (a) to (d).

(a) Island plumbing fixtures may be vented by extending an individual vent or a common vent as high as possible under the fixture enclosure and returning the vent vertically downward and connecting it to the fixture drain by means of a wye pattern fitting.

(b) Horizontal vent piping shall connect to the vertical section of the fixture vent and extend to a point where it can extend vertically to a vent terminal in accordance with sub. (16) or connect to another vent in accordance with sub. (15).

(c) Drainage fittings shall be used on all sections of the vent pipe below the floor level and a minimum slope of $\frac{1}{4}$ inch per foot to the drainage point shall be provided.

(d) Cleanouts shall be provided on the vent piping in accordance with s. ILHR 82.35.

Note 1: See Appendix for further explanatory material.

Note 2: See sub. (17) for venting provisions relating to laboratory sinks.

(13) WET VENTING. In lieu of providing individual vents, fixtures may be wet vented in accordance with pars. (a) to (c).

(a) *Vertical wet vents.* 1. Where 2 wall outlet fixtures are located on the same floor level with their fixture drains connecting to the same vertical drain pipe at different elevations, the lower fixture drain may be wet vented in accordance with subpars. a. to e.

a. No other fixtures may discharge into the vertical drain pipe above or between the 2 wall outlet fixtures. Additional fixtures may discharge into the vertical drain pipe below the 2 wall outlet fixtures.

b. A branch vent shall connect to the vertical drain pipe immediately above the higher fixture drain connection.

c. The entire vertical drain shall be at least one pipe size larger than the upper fixture drain, but not smaller than the lower fixture drain.

d. Both fixture drains shall conform to sub. (9). The connection of the lower fixture drain to the vertical drain shall be considered as the vent connection.

e. The higher fixture drain may not serve a water closet or urinal.

Note: See Appendix for further explanatory material.

(b) *Horizontal wet vents.* A drain from a lavatory or lavatories which are either provided with individual vents or a common vent may serve as the wet vent for not more than 2 bathtubs or showers and not more than 2 water closets in accordance with subds. 1. to 7. No other fixtures may discharge into or be served by the wet vent.

1. All of the fixtures shall be located in nonpublic bathroom groups.

2. The lavatories and bathtubs or showers shall have a common horizontal drain with the drain for the lavatories serving as a wet vent for the bathtubs or showers.

3. Where 2 bathtubs or showers are served by the same wet vent, their fixture drains shall connect independently to the common horizontal drain downstream of the vertical drain serving the lavatory or lavatories.

4. Where 2 bathtubs or showers and 2 water closets are served by the same wet vent a relief vent shall be provided, unless the wet vented horizontal drain connects to a drain stack with no other drain connections located above the wet-vented horizontal drain. The relief vent shall connect to the horizontal drain at a point downstream of the fixture drains for the water closets and upstream of any other fixture drain connections.

5. One or 2 water closets may connect to the common horizontal drain with the drain from the lavatories and bathtubs or showers also serving as a wet vent for the water closets. Where 2 water closets are served by the same wet vent, their fixture drains shall connect independently to the common horizontal drain at the same point.

6. The wet vent shall be at least 2 inches in diameter. No more than 4 drainage fixture units may discharge into a 2 inch diameter wet vent.

7. A branch vent shall connect immediately above the highest fixture drain connection and shall be sized in accordance with sub. (14).

(c) *Floor outlet fixtures.* An individual vent serving a floor outlet fixture, a common vent serving floor outlet fixtures, a circuit vent, a relief vent serving a circuit vented drain or a relief vent serving a wet vented horizontal drain may serve as a wet vent in accordance with subds. 1. to 4.

1. One or 2 wall outlet fixtures, each with a drainage fixture unit value of one or less may have their fixture drains connected individually into the individual vent, common vent, circuit vent or relief vent serving the floor outlet fixtures thereby forming a wet vent.

2. The wet vent shall be at least 2 inches in diameter.

3. The branch vent to which the wet vent connects shall be sized in accordance with sub. (14). The branch vent may serve the wall outlet fixtures in lieu of individual vents or a common vent.

4. The fixtures discharging into the wet vent shall be located on the same floor level as the floor outlet fixtures.

(14) VENT SIZE. (a) *Stack vents and vent stacks.* Stack vent and vent stack pipe sizes shall be determined in accordance with Table 82.31-2 on the basis of developed length and the diameter of the drain stack at its base.

1. The developed length of the stack vent shall be measured along the vent pipe, from the highest drain branch connection to the vent terminal or to the connection to a vent header.

2. The developed length of the vent stack shall be measured along the vent pipe from the vent stack base connection to the vent terminal or to the connection to a vent header.

Note: See Appendix for further explanatory material.

(b) *Vent headers.* 1. Vent header pipe sizes shall be determined in accordance with Table 82.31-3 with the number of drainage fixture units being the sum of the fixture unit loads of the stacks vented through that portion of the header. The diameter of a vent header shall not be less than any vent connecting to it.

2. The developed length of the vent header shall be measured along the pipe from the most distant vent stack or stack vent base connection to the vent terminal.

Note: See Appendix for further explanatory material.

(c) *Branch vents.* Branch vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of the branch vent shall be measured along the pipe from the furthest fixture drain served by the branch vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

Note: See Appendix for further explanatory material.

(d) *Individual vents.* Individual vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of an individual vent shall be measured along the vent pipe from the fixture drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

Note: See Appendix for further explanatory material.

(e) *Common vents.* Common vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of a common vent shall be measured along the vent pipe from the drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to the vent terminal.

(f) *Circuit vents.* Circuit vent pipe sizes shall be determined in accordance with Table 82.31-3. The developed length of the circuit vent shall be measured along the vent from the connection with the branch drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

Note: See Appendix for further explanatory material.

(g) *Relief vents.* Relief vents shall be sized in accordance with the provisions of subs. 1. to 4. The developed length of a relief vent shall be measured along the vent from the connection with the branch drain served by the vent to the point where it connects to a vent pipe of a larger diameter or to a vent terminal.

1. Circuit vented branch drain. The diameter of a relief vent for a branch drain served by a circuit vent shall be at least one half the diameter of the branch drain. The maximum developed length shall be determined from Table 82.31-3 based on the number of drainage fixture units served by the vent.

2. Drain stacks. A relief vent serving a drain stack shall be sized as a stack vent in accordance with par. (a).

3. Building drain. The diameter of a relief vent serving a building drain, as required in sub. (7), shall be at least one half the diameter of the building drain. The maximum developed length shall be determined from Table 82.31-3 based on the number of drainage fixture units served by the vent.

4. Horizontal wet vent. The diameter of a relief vent serving a horizontal wet vent shall be at least 1½ inches. The maximum developed length shall be determined from Table 82.31-3 based on the number of drainage fixture units served by the vent.

(h) *Yoke vents.* A yoke vent serving a drain stack shall be sized as a vent stack in accordance with par. (a).

(i) *Vents for sumps.* 1. a. Except as provided in subpar. b., the size of a vent for a sanitary pump with other than a pneumatic ejector, shall be determined in accordance with Table 82.31-4.

b. The size of a vent for a sanitary sump located outside with other than a pneumatic ejector shall be determined in accordance with Table 82.31-4, but shall not be less than 2 inches in diameter.

2. The air pressure relief pipe from a pneumatic ejector shall not be connected to vent or vent system serving a sanitary drain system, storm drain system or chemical waste system.

a. The relief pipe shall be of a size to relieve the air pressure inside the ejector to atmospheric pressure, but shall not be less than 2 inches in diameter where the ejector is located outside and 1¼ inches in diameter for all other ejector locations.

b. The vent shall terminate in accordance with the provisions of sub. (16).

Table 82.31-2
SIZE AND LENGTH OF VENT STACKS AND STACK VENTS

Diameter of Drain Stack at Base (inches)	Maximum Developed Length of Vent (feet)									
	Diameter of Vent (inches)									
	1¼	1½ ^a	2	3	4	5	6	8	10	12
1¼	50	150	NL ^b							
2	NP ^c	50	150	NL						
3		NP	50	400						
4		NP	20	180	700	NL				
5			NP	50	200	700				
6			NP	20	70	200	700	NL		
8				NP	25	60	250	800	NL	
10					NP	25	60	250	800	NL
12						NP	25	100	300	900

Note a: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

Note b: NL means No Limit.

Note c: NP means Not Permitted.

Table 82.31-3

MINIMUM DIAMETERS AND MAXIMUM LENGTH OF INDIVIDUAL, COMMON,
BRANCH AND CIRCUIT VENTS AND VENT HEADERS

Drainage Fixture Units (dfu)	Maximum Developed Length of Vent (feet)								
	Diameter of Vent (inches)								
	1½ ^a	1½ ^b	2	3	4	5	6	8	10
2	50	NL ^c							
4	40	200	NL						
8	NP ^d	150	250	NL					
10	NP	100	200	NL					
24	NP	50	150	NL					
42	NP	30	100	500	NL				
72		NP	50	400	NL				
240		NP	40	250	NL				
500		NP	20	180	700	NL			
1100			NP	50	200	700	NL		
1900			NP	20	70	200	700	NL	
3600				NP	25	60	250	800	NL
5600					NP	25	60	250	800

Note a: No water closets permitted.

Note b: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

Note c: NL means No Limit.

Note d: NP means Not Permitted.

Table 82.31-4
SIZE AND LENGTH OF VENTS FOR SANITARY SUMPS

Discharge Capacity of Ejector (gpm)	Maximum Developed Length of Vent ^a (feet)				
	Diameter of Vent (inches)				
	1½	1½	2	3	4
10	NL ^b				
20	270	NL			
40	72	160	NL		
60	31	75	270	NL	
80	16	41	150	NL	
100	10	25	97	NL	
150	NP ^c	10	44	370	NL
200		NP	20	210	NL
250		NP	10	132	NL
300		NP	10	88	380
400			NP	44	210
500				24	130

Note a: The developed length of the vent is measured along the pipe from the connection to the sump, to the point where it connects to a vent pipe of a larger diameter.

Note b: NL means No Limit.

Note c: NP means Not Permitted.

(15) VENT GRADES AND CONNECTIONS. (a) *Vent grade.* All vent and branch vent pipes shall be graded and connected so as to drain back to a drain pipe by means of gravity.

(b) *Installation.* Vents shall be installed in accordance with subds. 1. to 3.

1. Except for wet vent piping, the connection of a vent to horizontal drain piping shall be at a point above the horizontal center line of the drain piping.

2. Except as provided in subds. (12) and (17), vent piping serving a wall-outlet fixture may not offset horizontally less than 36 inches above

the floor, but in no case lower than the elevation of the highest flood level rim of any fixture served by the vent.

3. Vent piping may not connect to a branch vent less than 38 inches above the floor, but in no case lower than 2 inches above the elevation of the highest flood level rim of any fixture served by the vent.

Note: See Appendix for further explanatory material.

(16) VENT TERMINALS. All vents and vent systems shall terminate in the open air in accordance with this subsection.

(a) *Extension above roofs.* Extensions of vents through a roof shall terminate at least 8 inches above the roof. Where the roof is to be used for any purpose other than weather protection, the vents shall extend at least 7 feet above the roof.

(b) *Waterproof flashings.* The penetration of a roof system by a vent shall be made watertight with an approved flashing.

(c) *Prohibited uses.* Vent terminals shall not be used as flag poles, support for antennas or other similar purposes.

(d) *Location of vent terminals.* 1. A vent shall not terminate under the overhang of a building.

2. All vent terminals shall be located:

a. At least 10 feet from an air intake;

b. At least 5 feet from a power exhaust vent;

c. At least 10 feet horizontally from or 2 feet above roof scuttles, doors and openable windows; and

d. At least 5 feet from or 2 inches above parapet walls.

3. Where a structure has an earth covered roof extending from surrounding grade, the vent extension shall run at least 7 feet above grade and terminate with an approved vent cap. The portion of vent pipe outside the structure shall be without joints, except one fitting may be installed where the pipe leaves the top or side of the structure.

(e) *Extension through wall.* Where approved by the department, a vent may terminate through an exterior wall. Such a vent shall terminate at least 10 feet horizontally from any lot line and shall terminate downward. The vent shall be screened and shall comply with par. (d).

(f) *Extensions outside buildings.* Drain or vent pipe extensions shall not be located or placed on the outside of an exterior wall of any new building, but shall be located inside the building.

(g) *Frost closure.* For protection against frost closure, each vent terminal shall be at least 2 inches in diameter. Where it is necessary to increase the diameter of the vent, the change in diameter shall be made at least 6 inches inside the building.

(h) *Vents penetrating grade.* Vents penetrating grade shall be of cast iron above the point one foot below grade.

Note: See Appendix for further explanatory material.

(17) COMBINATION DRAIN AND VENT SYSTEMS. In lieu of providing individual vents, fixtures may be vented in accordance with pars. (a) to (c).

(a) *Stacks*. 1. A drain stack may serve as a combination drain and vent system for identical fixtures in accordance with subpars. a. to e.

a. The drain stack shall not serve more than 3 identical fixtures. Each fixture shall be located on a separate floor level.

b. The drain stack shall be limited to serving kitchen sinks with or without food waste grinders or dishwasher connections within dwelling units, drinking fountains and lavatories.

c. The drain stack shall not be offset horizontally above the lowest fixture drain connection.

d. The developed length of any fixture drain from the trap weir to the drain stack shall not exceed the limits specified in Table 82.31-1.

e. The drain stack shall be sized in accordance with Table 82.31-5 and shall extend undiminished in diameter from the connection to the building drain to a vent terminal in accordance with sub. (16).

Note: See Appendix for further explanatory material.

Table 82.31-5

Fixtures Connected	Size of stack (inches)
Drinking Fountains	1½
Lavatories	2
Kitchen Sinks	3

2. A drain stack may serve as a combination drain and vent system for a kitchen sink and a laundry tray in accordance with subpars. a. to d.

a. One kitchen sink within a dwelling unit, with or without a food waste grinder or dishwasher connection shall connect to the drain stack above the laundry tray. No other fixtures may connect to the drain stack.

b. The drain stack shall be at least 2 inches in diameter below the kitchen sink connection and it shall be at least 4 inches in diameter below the laundry tray connection.

c. In lieu of the minimum sizes as required in subpar. b., the entire stack below the kitchen sink connection may be 3 inches in diameter.

d. The drain stack shall not offset horizontally above the fixture drain connection for the laundry tray.

Note: See Appendix for further explanatory material.

(b) BUILDING DRAINS. A building drain may serve as a combination drain and vent system for floor drains and floor outlet fixtures in accordance with subds. 1. to 6.

1. A vent stack or a drain stack at least 2 inches in diameter shall be connected upstream of any building drain branch.

2. No more than 2 water closets may connect to the building drain by means of building drain branches.

3. a. That portion of the building drain between the connection of the building drain branch and the vent stack or drain stack required in subd. 1. shall be at least one pipe size larger than the minimum size permitted in Table 82.30-3 based on the total drainage fixture unit load.

b. The vent stack or drain stack required in subd. 1. shall be at least one-half the diameter of that portion of the building drain which is vented by the stack, but may not be less than 2 inches in diameter.

c. A stack vent serving a drain stack required in subd. 1. shall be at least one half the diameter of that portion of the building drain which is vented by the stack, but may not be less than 2 inches in diameter.

4. The trap of a floor drain or a floor outlet fixture, except a water closet, connected to a building drain branch shall be at least 3 inches in diameter.

5. A building drain branch shall not connect to a building drain downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 20 pipe diameters of the building drain.

6. The pitch and the developed length of the building drain branch shall not exceed the limits specified in Table 82.31-1.

Note: See Appendix for further explanatory material.

(c) *Laboratory sink venting.* A horizontal drain may serve as a combination drain and vent system for island laboratory sinks in accordance with subs. 1. to 7.

1. A vent stack or a drain stack at least 2 inches in diameter shall be connected upstream of any fixture drain vented by the combination drain and vent system.

2. a. That portion of the horizontal drain between the connection of fixture drain and the vent stack or drain stack required in subd. 1. shall be at least one pipe size larger than the minimum size permitted in Table 82.30-2 based on total drainage fixture unit load.

b. The vent stack or drain stack required in subd. 1. shall be at least one-half the diameter of that portion of the horizontal drain which is vented by the stack, but may not be less than 2 inches in diameter.

c. A stack vent serving a drain stack required in subd. 1 shall be at least one half the diameter of that portion of the horizontal drain which is vented by the stack, but may not be less than 2 inches in diameter.

3. All fixture drains vented by the horizontal drain shall be at least 3 inches in diameter.

4. Fixture drains vented by the horizontal drain shall be at least 3 inches in diameter.

5. An individual vent or common vent shall be extended as high as possible under the sink enclosure and then returned vertically downward

and connected to the horizontal drain. A cleanout shall be provided on the vent piping.

6. In lieu of connecting the vent to the horizontal drain which forms the combination drain and vent system, the vent may connect to a horizontal fixture drain vented by the combination drain and vent system. The pitch and developed length of the horizontal fixture drain shall not exceed the limits specified in Table 82.31-1.

7. Fixture drains to be vented by the horizontal drain shall not connect to a horizontal drain downstream from the base fitting of a drain stack 2 inches or larger in diameter within the distance equal to 20 pipe diameters of the horizontal drain serving the stack.

Note: See Appendix for further explanatory material.

(18) **PROHIBITED USES.** A vent or vent system shall not be used for purposes other than the venting of the plumbing system.

(a) *Boiler blowoff basin vents.* Vent piping from boiler blowoff basins shall not be connected to a vent or vent system serving a sanitary drain system, storm drain system or chemical waste system.

(b) *Chemical waste vents.* Vent piping for chemical waste systems shall not be connected to a vent system serving a sanitary drain system or storm drain system.

(c) *Steam vents.* Vents serving steam operated sterilizers, cleansing or degreasing equipment, pressing machines or any other apparatus which normally discharges steam into the vent shall not be connected to a vent or a vent system serving a sanitary drain system, storm drain system or chemical waste system.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (11) (a), (17) (b) 3. b. and (c) 2. b., r. and recr. (11) (b), r. (13) (a) 2., cr. (17) (b) 3. c. and (c) 2. c., Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 82.32 Traps and direct fixture connections. (1) **SCOPE.** The provisions of this section set forth the requirements for the types and installation of traps and direct fixture connections.

(2) **MATERIALS.** All traps and fixture connections shall be of approved materials in accordance with ch. ILHR 84.

(3) **GENERAL.** Each plumbing fixture, each compartment of a plumbing fixture and each floor drain shall be separately trapped by a water seal trap, except as provided in par. (a). A fixture shall not be double trapped.

(a) *Trap exceptions.* The plumbing fixtures listed in subs. 1. to 3. shall not be required to be separately trapped:

1. Fixtures having integral traps;

2. Compartments of a combination plumbing fixture installed on one trap, provided:

a. No compartment is more than 6 inches deeper than any other;

b. The distance between the compartments' waste outlets farthest apart does not exceed 30 inches; and

c. No compartment waste outlet is equipped with a food waste grinder.

3. Storm drains as provided in s. ILHR 82.36 (14) (b).

(b) *Trap seals.* Each trap shall provide a liquid seal depth of not less than 2 inches and not more than 4 inches, except as otherwise specified in this chapter.

(c) *Loss of trap seal.* A trap seal primer valve may be installed on a trap subject to high rates of evaporation.

1. A trap seal primer valve shall be installed on a receptor of indirect wastes not subject to year round use.

2. Trap seal primer valves shall conform to ASSE 1018.

Note: A list of referenced standards is contained in ch. ILHR 84.

(d) *Design.* Traps shall be self-scouring and shall not have interior partitions, except where such traps are integral with the fixture. Uniform diameter P-traps shall be considered self-scouring.

(e) *Size.* Traps shall be of diameters not less than those specified in Table 82.30-1 of s. ILHR 82.30.

(f) *Prohibited traps.* The installation of the types of traps listed in subds. 1. to 6. shall be prohibited:

1. Bell traps;

2. Drum traps, except where specifically approved by the department;

3. S-traps which are not integral parts of fixtures;

4. Separate fixture traps which depend on interior partitions for the trap seal;

5. Traps which depend upon moving parts to maintain the trap seal; and

6. Traps which in case of defect would allow the passage of sewer air.

(4) *INSTALLATION.* (a) *Setting of traps.* All traps shall be rigidly supported and set true with respect to the water level and so located as to protect the water seals, and shall be protected from freezing and evaporation.

(b) *Distance from fixture drain outlets.* 1. Vertical distance. Except as provided in subpars. a. to c., the vertical distance between the top of the fixture drain outlet and the horizontal center line of the trap outlet shall not exceed 15 inches.

a. The vertical distance between the top of the strainer of a floor drain or the opening of a standpipe receptor and the horizontal center line of the trap outlet shall not exceed 36 inches.

b. The vertical distance between the top of the fixture drain outlet of a pedestal drinking fountain and the horizontal center line of the trap outlet shall not exceed 60 inches.

c. The vertical distance between the water level in the bowl of a floor outlet water closet and the center line of the horizontal portion of the fixture drain shall not exceed 36 inches.

2. Horizontal distance. The horizontal distance between the vertical center line of a fixture drain outlet and the vertical center line of the trap inlet shall not exceed 15 inches, except the horizontal distance for a pedestal drinking fountain shall not exceed 24 inches.

Note: See Appendix for further explanatory material.

(5) DIRECT FIXTURE DRAIN CONNECTION. Except as provided in s. ILHR 82.33, all plumbing fixtures and appliances discharging wastes shall connect directly to a drain system.

(a) *Floor drains.* 1. Floor drains shall be so located as to be accessible for cleaning purposes.

2. A floor drain receiving the wash from garbage cans shall be at least 3 inches in diameter.

(b) *Kitchen sinks.* Horizontal drain piping serving a kitchen sink trap shall not connect to vertical drain piping by means of a double sanitary tee.

(c) *Water closets.* A water closet shall discharge through a drain pipe or fitting with a minimum diameter of 3 inches.

1. A floor mounted wall outlet water closet shall connect to a 4 inch or 4 × 3 inch closet collar fitting or to a horizontal or vertical carrier type fitting.

2. A floor outlet water closet shall connect to a 4 inch or 4 × 3 inch closet collar fitting. A 4 × 3 inch closet bend fitting may be installed where a 4 inch closet collar fitting is used.

3. A wall mounted wall outlet water closet shall connect to a horizontal or vertical carrier type fitting.

4. Two water closets discharging to a vertical drain from opposite sides by means of the same fitting shall be installed in accordance with subpars. a. and b.

a. Where the vertical drain is 3 inches in diameter, the fitting for floor outlet water closets shall be a 3 inch double wye pattern fitting.

b. Where the water closets are wall outlet types the fitting shall be a double wye pattern fitting or a carrier-type fitting.

(d) *Blowout-type fixtures.* Blowout-type plumbing fixtures shall be installed in accordance with the approval of the department.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (4) (a), cr. (5) (intro.) and (d), Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 82.33 Indirect and local waste piping. (1) **SCOPE.** (a) The provisions of this section set forth the requirements for the installation of indirect waste piping and local waste piping.

(b) Indirect waste piping and local waste piping draining the fixtures, appliances and devices having a public health concern, including but not limited to those listed in Table 82.33-1, shall be considered as plumbing and shall comply with the provisions of this section.

Table 82.33-1

TYPES OF FIXTURES, APPLIANCES AND DEVICES OF A PUBLIC HEALTH CONCERN

Refrigerated food storage rooms and compartments	Coffee makers and urns
Refrigerated food display cases	Food processing equipment
Ice compartments	Baptismal founts
Vending machines	Clothes washers and extractors
Steam tables and kettles	Dishwashers
Food preparation sinks	Still
Potato peelers	Sterilizers
Egg boilers	Bar and soda fountains
	Boiler blowoff basin outlet drains

(2) **MATERIALS.** Indirect waste piping more than 30 inches in length and all local waste piping shall be of approved materials in accordance with ch. ILHR 84.

(3) **SIZE.** Indirect waste piping more than 30 inches in length and all local waste piping shall be sized in accordance with s. ILHR 82.30, except indirect or local waste piping not exceeding 20 feet in length for refrigerated food display cases may be one inch in diameter.

(4) **INSTALLATION.** Indirect waste piping and local waste piping shall be so installed as to permit access for flushing and cleaning.

(5) **TRAPS.** (a) *Indirect waste piping.* 1. Gravity flow indirect waste piping more than 30 inches in length shall be provided with a trap in accordance with s. ILHR 82.32 (4), except indirect waste piping draining a sterilizer shall not be trapped.

2. All indirect waste piping draining a refrigerated compartment shall be provided with a trap in accordance with s. ILHR 82.32 (4).

(b) *Local waste piping.* Local waste piping handling sanitary wastes and more than 30 inches in length shall be provided with a trap in accordance with s. ILHR 82.32 (4).

(6) **MAXIMUM LENGTH.** Indirect waste piping and local waste piping handling sanitary wastes shall not exceed 30 feet in length horizontally nor 15 feet in length vertically.

(7) **AIR-GAPS AND AIR-BREAKS.** All indirect waste piping and all local waste piping shall discharge by means of an air-gap or air-break into a receptor.

(a) *Air-gap installation.* 1. The distance of an air-gap between indirect waste piping one inch or less in diameter and the receptor shall be at least twice the diameter of the indirect waste piping.

2. The distance of an air-gap between indirect waste piping larger than one inch in diameter and the receptor shall be not less than 2 inches.

(b) *Air-break installation.* The air-break between indirect waste piping or local waste piping and the receptor shall be accomplished by extending the indirect waste piping or local waste piping below the flood level rim of the receptor.

Note: See Appendix for further explanatory material.

Register, May, 1988, No. 389

(8) **RECEPTORS.** A receptor receiving the discharge from indirect waste piping or local waste piping shall be of a shape and capacity as to prevent splashing or flooding. Receptors shall be installed in accordance with this subsection and shall be accessible.

(a) *Waste sinks and standpipes.* 1. A waste sink or a standpipe serving as a receptor shall have its rim at least one inch above the floor.

2. A waste sink or a standpipe serving as a receptor shall be individually trapped in accordance with s. ILHR 82.32.

(b) *Floor sinks.* A floor sink serving as a receptor shall be equipped with a removable metal basket over which the indirect waste piping or local waste piping is to discharge, or the floor sink shall be equipped with a dome strainer. Indirect waste piping or local waste piping shall not discharge through a traffic grate, but shall terminate over an ungrated portion of the floor sink.

(c) *Local waste piping.* 1. Local waste piping serving as a receptor shall discharge to a waste sink, standpipe or floor sink, except as provided in subd. 2.

2. Local waste piping serving as a receptor for a water heater safety relief valve may discharge to a floor drain.

3. Local waste piping may not receive the discharge from another local waste pipe.

(d) *Prohibited receptors.* Except as provided in subds. 1. and 2., a plumbing fixture which is used for domestic or culinary purposes shall not be used as a receptor for indirect waste piping or local waste piping.

1. The indirect waste piping of a portable dishwasher may discharge into a kitchen sink of a dwelling unit.

2. The indirect waste piping of an automatic clothes washer may discharge into a laundry tray.

Note: See Appendix for further explanatory material.

(9) **INDIRECT WASTE PIPING REQUIRED.** (a) *Boilers, pressure tanks and relief valves.* Boilers, pressure tanks, relief valves and similar equipment discharging to a drain system shall be by means of an air-gap.

1. Steam pipes shall not connect or discharge to any part of a plumbing system.

2. Waste water more than 160° F. in temperature shall not discharge into any part of a plumbing system.

(b) *Clear water wastes.* 1. Clear water wastes, except those from a drinking fountain, discharging to a drain system shall be by means of an air-gap.

2. The clear water wastes from a drinking fountain discharging to a drain system shall be by means of a direct connection.

(c) *Clothes washers.* 1. Residential types. Residential-type clothes washers shall discharge into the sanitary drain system by means of an air-break.

a. A standpipe receptor shall not extend more than 36 inches nor less than 18 inches above the top of the trap inlet.

b. The top of a standpipe receptor shall terminate at least 32 inches but not more than 42 inches above the floor on which the washer is located.

2. Self-service laundries. Pumped-discharge automatic clothes washing equipment in laundrettes, laundromats and self-service laundry establishments shall have the wastes discharge to a drain system by means of standpipes. The standpipes shall be installed in accordance with subd. 1.

a. The maximum number of washers which may be connected to a trap shall be in accordance with Table 82.33-2.

b. Washer wastes shall not be discharged to gutters, troughs, local waste piping, indirect waste manifold or other similar connections.

Table 82.33-2
WASHER CONNECTIONS

Trap Diameter	Maximum Number of Washers
2 inches	2 machines
3 inches	3 machines
4 inches	4 machines

3. Commercial. Gravity discharge-type clothes washing equipment shall discharge by means of an air-break or by other approved methods into a floor receptor, trench or trough.

a. The receptor shall be sized to hold one full simultaneous discharge load from every machine draining into the receptor.

b. The size of the receptor drain shall be determined by the manufacturer's discharge flow rate and the frequency of discharge.

Note: See Appendix for further explanatory material.

c. All wastes from the washers shall flow through a commercial laundry interceptor as specified in s. ILHR 82.34.

(d) *Dishwashing machines.* 1. Residential-type. A residential-type dishwashing machine shall discharge to the sanitary drain system by means of a fixed air-gap or air-break located above the high water level of the dishwashing machine. The indirect waste piping or hose from the dishwashing machine shall not exceed a developed length of 10 feet. The indirect waste piping shall be installed in accordance with one of the methods specified in subpars. a. and b.

a. An air-gap or air-break may be located below a countertop. Where the air-gap or air-break is located below a countertop, the indirect waste piping from the dishwashing machine shall discharge into a standpipe. The standpipe shall be at least 1½ inches in diameter and shall extend at least 12 inches above the trap inlet.

b. An air-gap may be located above a countertop. Where the air-gap is located above a countertop, the indirect waste piping from a dishwashing machine shall discharge into either a standpipe or local waste piping. The

standpipe shall be at least 1½ inches in diameter and shall extend at least 12 inches above the trap inlet. The local waste piping shall connect to the fixture drain of a kitchen sink above the trap inlet. Where a hose is used for local waste piping, the developed length shall not exceed 18 inches.

2. Commercial. Commercial dishwashing machines shall discharge into a sanitary drain system by means of a fixed air-gap into a trapped and vented receptor. The indirect waste piping shall not be more than 30 inches in length.

3. Prohibited installations. No dishwashing machine may discharge into or through a food waste grinder.

Note: See Appendix for further explanatory material.

(e) *Drips and drain outlets.* Appliances, devices and apparatus not defined as plumbing fixtures which have drip or drain outlets shall be drained through indirect waste piping into an open receptor by means of an approved air-gap or air-break.

(f) *Elevator pit subsoil and floor drains.* A subsoil or floor drain installed in an elevator pit shall discharge through indirect waste piping for disposal in accordance with s. ILHR 82.36 (3).

1. A sump pump shall not be located in an elevator pit.

2. The sump containing the pump for an elevator pit shall have a submerged inlet constructed to maintain a minimum 6 inch trap seal.

Note: See Appendix for further explanatory material.

(g) *Food handling establishments.* Plumbing fixtures, devices and appurtenances installed in food handling establishments engaged in the storage, preparation, selling, serving or processing of food shall be installed in accordance with this paragraph.

1. Bar and soda fountain sinks. Where a bar or soda fountain sink is so located that the trap for the sink cannot be vented as specified in s. ILHR 82.31, the sink drain shall discharge to the sanitary drain system through indirect waste piping.

a. Where the indirect waste piping is not trapped, the wastes shall be discharged by means of an air-gap.

b. Where the indirect waste piping is trapped, the wastes shall be discharged by means of an air-gap or air-break.

2. Beer taps, coffee makers, glass fillers and soda dispensers. The drip pan from a beer tap, coffee maker, glass filler, soda dispenser or similar equipment shall discharge to the sanitary drain system through indirect waste piping by means of an air-break or air-gap.

3. Novelty boxes, ice compartments and ice cream dipper wells. Novelty boxes, ice compartments and ice cream dipper wells shall discharge to the sanitary drain system through indirect waste piping by means of an air-gap.

a. The indirect waste piping shall not exceed 30 inches in length.

b. The indirect waste piping draining a novelty box or ice compartment shall not discharge or connect to the indirect waste piping or local

waste piping of any other fixture, appliance or device other than a novelty box or ice compartment.

4. Refrigerated food storage rooms, compartments and display cases. Drains serving refrigerated food storage rooms, compartments or display cases shall discharge to the sanitary drain system through indirect waste piping. The indirect waste piping shall drain by gravity to a receptor by means of an air-gap or air-break. Where an air-break is installed, the flood level rim of the receptor shall be at least 2 inches below the top of fixture strainer or drain opening in the refrigerated room, compartment or display case.

5. Enclosed food processing equipment. Coffee urns, egg boilers, potato peelers, steam kettles, steam tables, vending machines and similar types of enclosed food processing equipment shall be discharged to the sanitary drain system through indirect waste piping by means of an air-gap.

6. Preparation sinks. Open culinary sinks for thawing or washing food shall discharge to the sanitary drain system through indirect waste piping by means of an air-gap. The indirect waste piping may not exceed a length of 30 inches.

Note: See Appendix for further explanatory material.

(h) *Sterilizers*. Appliances, devices or apparatus, such as stills, sterilizers and similar equipment requiring waste connections and used for sterile materials, shall discharge through indirect waste piping to the sanitary drain system by means of an air-gap.

Note: See s. ILHR 82.50 regarding sterilizer wastes.

(i) *Swimming pools*. 1. Waste water from swimming or wading pools, including pool drainage and backwash from sand filters, shall be discharged to the storm sewer through indirect waste piping.

2. Waste water from floor drains which serve interior walks around pools and backwash from diatomaceous earth filters shall be discharged to the sanitary sewer through indirect waste piping.

3. Where a recirculation pump is used to discharge waste pool water to the drain system, the pump shall discharge to the drain system through indirect waste piping.

4. All indirect waste piping serving pools and pool areas shall discharge by means of an air-gap.

5. The requirements for sewer connections as specified in ch. HSS 171 shall apply to all swimming pools.

(j) *Vacuum systems — central units*. Central vacuum units shall discharge by means of an air-gap or air break.

(k) *Water treatment devices*. The wastes from water treatment devices shall discharge to a drain system through indirect waste piping by means of an air-gap.

Note: For appliances, devices and equipment not included in this section or other sections contact the department for information and proposed installation review.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Table 82.33-1 and (9) (g) 5., cr. (8) (c) 3., (9) (g) 6. and (k), Register, May, 1988, No. 389, eff. 6-1-88.

Register, May, 1988, No. 389

ILHR 82.34 Interceptors and catch basins for special and industrial wastes. (1) **SCOPE.** The provisions of this section set forth the requirements for design and installation of interceptors and catch basins to handle special and industrial wastes.

(2) **MATERIALS.** All piping, interceptors and catch basins for special and industrial wastes shall be of approved materials in accordance with ch. ILHR 84.

(3) **GENERAL.** Any deleterious waste material which is discharged into a plumbing system shall be directed to an interceptor, catch basin or other approved device. The interceptor, catch basin or approved device shall be capable of separating the deleterious waste material from the normal sewage and retaining the deleterious waste material to facilitate its periodic removal or treatment or both.

(a) *Deleterious waste materials.* For the purpose of this subsection, deleterious waste materials include any waste material, other than that from dwelling units, which may:

1. Congeal, coagulate or accumulate in drains and sewers, thereby, creating stoppages or retarding the discharge flow;
2. Retard or interfere with municipal sewage treatment processes;
3. Pass through a treatment process and pollute the watercourse receiving the treatment effluent;
4. Create explosive, flammable, noxious, toxic or other hazardous mixtures of materials; or
5. Damage, destroy or deteriorate sewers or piping materials or structures.

Note: See Chapter Ind 8 as to flammable and combustible liquids.

(b) *Private disposal systems.* The special or industrial wastes from any plumbing system which are not discharged into a public sewer system shall be treated or disposed in compliance with the rules of the state agency having jurisdiction. The treatment or disposal system shall be installed so as not to endanger any water supply which is or may be used for drinking, culinary or bathing purposes, or which may create a nuisance, unsanitary conditions or water pollution.

(c) *Velocity control.* Interceptors, catch basins and other similar devices shall be designed, sized and installed so that flow rates shall be developed and maintained in a manner that solid and floating materials of a harmful, hazardous or deleterious nature will be collected in the interceptor for disposal.

Next page is numbered 97

- a. Cleanouts are located not more than 100 feet apart;
- b. Manholes are located not more than 400 feet apart;
- c. The distance from a cleanout to a manhole located upstream is not more than 200 feet; or
- d. The distance from a manhole to a cleanout located upstream is not more than 300 feet.

2. Sanitary building sewers 8 inches or larger in diameter shall be provided with manholes at:

- a. Every change in direction of 45 ° or more;
- b. Every change in pipe diameter; and
- c. Intervals of not more than 400 feet.

(c) *Storm building sewers.* 1. Storm building sewers 10 inches or less in diameter shall be provided with cleanouts or manholes such that:

- a. Cleanouts are located not more than 100 feet apart;
- b. Manholes are located not more than 400 feet apart;
- c. The distance from a cleanout to a manhole located upstream is not more than 200 feet; or
- d. The distance from a manhole to a cleanout located upstream is not more than 300 feet.

2. Storm building sewers 12 inches or larger in diameter shall be provided with manholes or storm drain inlets with an inside diameter of at least 36 inches at:

- a. Every change in direction of 45 ° or more;
- b. Every change in pipe diameter; and
- c. Intervals of not more than 400 feet.

(d) *Private interceptor main sewers.* 1. Private interceptor main sewers 5 inches or less in diameter shall be provided with a cleanout or manhole at the most upstream point of the private interceptor main sewer and such that:

- a. Cleanouts are located not more than 100 feet apart;
- b. Manholes are located not more than 400 feet apart;
- c. The distance from a cleanout to a manhole located upstream is not more than 200 feet; or
- d. The distance from a manhole to a cleanout located upstream is not more than 300 feet.

2. Private interceptor main sewers 6 inches or larger in diameter shall be provided with a manhole at:

- a. The most upstream point of the private interceptor main sewer;
- b. Every change in direction;

- c. Every change in pipe diameter; and
- d. Intervals of not more than 400 feet.

(e) *Junction of building drain and building sewer.* A cleanout shall be provided near the junction of a building drain and a building sewer.

1. The cleanout shall be located within 5 feet of where the building drain and the building sewer connect. The cleanout may be located either inside or outside the building.

2. A cleanout in a drain stack may serve as the cleanout at the junction of the building drain and building sewer, if the stack is within 5 feet of where the building drain and building sewer connect.

(f) *Stacks.* Where a cleanout is provided in a drain stack, the cleanout shall be located 28 to 60 inches above the lowest floor penetrated by the stack.

(g) *Branches.* Cleanouts shall be provided in connection with batteries of fixtures at such points that all parts of the branch drain pipes may be reached for cleaning or removal of stoppages. For the purposes of this requirement, removable fixture traps may serve as a cleanout opening.

(h) *Greasy wastes.* Drain pipes carrying greasy wastes shall be provided with cleanouts located not more than 40 feet apart and at all changes in direction of more than 45°.

(i) *Double sanitary tees.* A cleanout shall be provided immediately above or below a double sanitary tee drain fitting which is installed in a vertical drain pipe of less than 3 inches in diameter, unless a stack cleanout is provided in accordance with par. (f).

(j) *Traps.* All traps shall be constructed or installed so that stoppages may be removed from the traps. If a trap is not accessible for removal or does not contain a removable dip, a cleanout or a removable inlet shall be installed to enable cleaning of the trap passageway.

(k) *Conductors.* Where a cleanout is provided in a conductor, the cleanout shall be located 28 to 60 inches above the lowest floor penetrated by the conductor.

(l) *Sampling manholes.* Municipalities or sanitary sewage districts by ordinance or rule may require the installation of sampling manholes for periodic sewage monitoring.

Note: The installation of sampling manholes may be needed for the monitoring of industrial wastes under chs. NR 200 to 299.

(4) **DIRECTION OF FLOW.** Every cleanout shall be installed so as to open in the direction of the waste flow or at a right angle thereto.

(5) **ACCESSIBILITY.** Cleanout plugs shall not be covered with cement, plaster, or any other similar permanent finishing material.

(a) *Underground piping.* Cleanouts installed in underground drain piping shall be extended vertically to or above the finish grade.

1. The cleanout extension to grade shall connect to the drain piping through a wye pattern fitting.

2. A cleanout located outside of a building shall be provided with a frost sleeve.

a. The frost sleeve shall be of a material approved for building sewers in accordance with s. ILHR 84.30 (1) (c).

b. Where a cleanout is located in an area subject to vehicular traffic the top of the frost sleeve shall terminate in a concrete pad at least 4 inches thick and extending at least 9 inches from the sleeve on all sides, sloping away from the sleeve.

c. The bottom of the frost sleeve shall terminate 6 to 12 inches above the top of the drain piping.

d. The frost sleeve shall have a removable watertight top of sufficient thickness and strength to sustain the weight of anticipated traffic.

Note: See Appendix for further explanatory material.

(b) *Concealed piping.* Cleanout access for drain piping located in concealed spaces shall be provided by either extending the cleanout to at least the surface of a wall or floor or by providing access panels of a sufficient size to permit removal of the cleanout plug and proper cleaning of the pipe.

(6) **CLEANOUT SIZE.** Cleanouts and cleanout extensions shall be sized in accordance with Table 82.35.

Table 82.35
CLEANOUT SIZES

Diameter of Pipe Served by Cleanout (inches)	Minimum Diameter of Cleanout Extension (inches)	Minimum Diameter of Cleanout Opening (inches)
1½	1½	1½
2	1½	1½
3	3	2½
4	4	3½
5	5	4
6	6	5
8 and larger	6	6

(7) **PROHIBITED USE OF CLEANOUT OPENINGS.** Cleanout openings shall not be used for the installation of fixtures or floor drains, except where another cleanout of equal access and capacity is provided.

(8) **MANHOLES.** (a) *Diameter.* The minimum diameter of manholes shall be 42 inches. A manhole shall have a minimum access opening of 24 inches.

(b) *Materials.* Manholes shall be constructed of approved materials in accordance with ch. ILHR 84 and in accordance with the design provisions of s. NR 110.13.

Note 1: The provisions of NR 110.13 regarding the manhole's flow channel, watertightness, and drop pipe indicate the following specifications:

- The flow channel through manholes shall be made to conform to the shape and slope of the sewer. See Appendix for further explanatory material.

ILHR 82

- Solid watertight manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water. Where groundwater conditions are unfavorable, manholes of brick or block shall be waterproofed on the exterior with plastic coatings supplemented by a bituminous waterproof coating or other approved coatings. Inlet and outlet pipes are to be joined to the manhole with a gasketed flexible watertight connection or any watertight connection arrangement that allows differential settlement of the pipe and manhole wall to take place.

- An outside drop pipe is to be provided for a sewer entering a manhole where the invert elevation of the entering sewer is 2 feet or more above the spring line of the outgoing sewer. The entire drop connection shall be encased in the concrete. Inside drop connection may be approved on a case-by-case basis.

Note: See Appendix for further explanatory material.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. (3) (i), r. and recr. (3) (j), Register, May, 1988, No. 389, eff. 6-1-88.

ILHR 82.36 Storm and clear water drain systems. (1) **SCOPE.** The provisions of this section set forth the requirements for the design and installation of storm and clear water drain systems including storm building drains and sewers.

(2) **MATERIALS.** All storm and clear water drain systems shall be constructed of approved materials in accordance with ch. ILHR 84.

(3) **DISPOSAL.** (a) *Storm sewer.* Storm water, surface water, groundwater and clear water wastes shall be discharged to a storm sewer system or a combined sanitary-storm sewer system where available. Combined public sanitary-storm sewer systems shall be approved by the department of natural resources. Combined private sanitary-storm sewer systems shall be approved by the department.

(b) *Other disposal methods.* 1. Where no storm sewer system or combined sanitary-storm sewer system is available or adequate to receive the anticipated load, the storm water, surface water, groundwater and clear water wastes shall be discharged in accordance with local governmental requirements.

2. Where approved by the local governmental authority, storm water, surface water, groundwater and clear water wastes of the properties of one- and 2-family dwellings may be discharged onto flat areas, such as streets or lawns, so long as the water flows away from the buildings and does not create a nuisance.

(c) *Segregation of wastes.* 1. a. Except as provided in subd. 3., where a sanitary sewer system and a storm sewer system are available the drain piping for storm water or clear water wastes may not connect to any part of the sanitary drain system.

b. Where a combined sanitary-storm sewer system is available storm water wastes, clear water wastes and sanitary wastes may not be combined until discharging to the building sewer.

2. Storm water wastes and clear water wastes shall not be combined until discharging into the storm building drain.

3. The clear water wastes from a refrigerated drinking fountain, water heater or storage tank relief valve or water softener shall be discharged to either a sanitary drain system or a storm drain system.

(4) **LOAD ON DRAIN PIPING.** (a) *Storm water drainage.* The load factor on storm water drain piping shall be computed in terms of gallons per min-
Register, May, 1988, No. 389

ute or on the square footage of the horizontal projection of roofs, paved areas, yards and other tributary areas.

(b) *Continuous flow devices.* Where there is a continuous or semicontinuous discharge into the storm building drain or storm building sewer, as from a pump, air conditioning unit, or similar device, each gallon per minute of such discharge shall be computed as being equivalent to 26 square feet of roof area.

(5) **SELECTING SIZE OF STORM AND CLEAR WATER DRAIN PIPING.** (a) *Horizontal storm water drain piping.* The pipe size for horizontal drain piping for storm water shall be determined from Tables 82.36-1 to 82.36-4.

Table 82.36-1

**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING
SERVING ROOF AREAS**

Pipe Diameters (in inches)	Maximum Roof Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
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

Note: Divide square footage by 26 to obtain flow in gpm.

Table 82.36-2

**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING
PAVED OR GRAVELED GROUND SURFACE AREAS**

Pipe Diameters (in inches)	Maximum Surface Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
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	11,850	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

Note: Divide square footage by 32.5 to obtain flow in gpm.

Table 82.36-3

**MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING
LAWNS, PARKS AND SIMILAR LAND SURFACES**

Pipe Diameters (in inches)	Maximum Surface Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
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	626,080	718,640	1,027,520	1,497,600
24	748,800	1,046,240	1,528,800	2,184,000

Note: Divide square footage by 104 to obtain flow in gpm.

Table 82.36-4

**MAXIMUM CAPACITY OF STORM WATER
HORIZONTAL DRAIN PIPING FLOWING FULL**

Pipe Diameters (in inches)	Maximum Capacities in Gallons Per Minute			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	25	35	50	70
4	50	75	115	145
5	97	140	195	270
6	160	230	320	450
8	355	500	700	1,000
10	680	950	1,300	1,940
12	1,050	1,580	2,200	3,150
15	2,000	2,800	4,050	5,640
18	3,300	4,675	6,700	9,500
21	6,020	6,910	9,880	14,400
24	7,200	10,060	14,700	21,000

(b) *Vertical conductors for storm water.* 1. A vertical conductor for storm water shall not be smaller than the largest horizontal branch connected thereto.

2. Vertical conductors shall be sized in accordance with Table 82.36-5 or the diameter D, where

$$D = 1.128 \sqrt{\frac{A}{X}}$$

Where,

A = the area of the roof in square feet

X = 300 square feet per square inch for a roof covered with gravel or slag and with a pitch not exceeding ¼ inch per foot; or

= 250 square feet per square inch for a roof covered with gravel or slag and with a pitch of greater than ¼ inch per foot; or

= 200 square feet per square inch for a roof with a metal, tile, brick or slate covering and of any pitch.

Table 82.36-5
MINIMUM DIAMETER OF VERTICAL CONDUCTORS

Type of Roof	Maximum Roof Areas (in square feet)					
	Pipe Diameters (in inches)					
	2½	3	4	5	6	8
Roofs covered with gravel, slag, or similar material and with a pitch of ¼" per foot or less.	1,645	2,120	3,780	5,885	8,490	15,125
Roofs covered with gravel, slag or similar material and with a pitch greater than ¼" per foot.	1,220	1,770	3,150	4,905	7,075	12,600
Roofs covered with metal, tile, brick, slate or similar material and of any pitch.	975	1,415	2,520	3,925	5,660	10,080

Note: Divide square footage by 26 to obtain flow in gpm.

(c) *Clear water drain piping.* Drain piping for clear water shall be sized in accordance with s. ILHR 82.30 (3) and (4).

(d) *Minimum size of underground drain piping.* Any portion of a storm or clear water drain system installed underground shall not be less than 2 inches in diameter. Underground drain piping which is 2 inches in diameter shall not exceed a length of 20 feet.

(e) *Minimum size of storm building sewers.* The pipe size for storm building sewers shall be determined from Tables 82.36-1 to 82.36-4. Storm building sewers serving combined storm water and clear water wastes shall be sized in accordance with Table 82.36-4.

1. Gravity flow sewers. a. The minimum size of a gravity flow storm building sewer shall be 3 inches in diameter between the building and lot line and 4 inches in diameter between the lot line and public sewer or private interceptor main sewer. A municipality or sanitary district by ordinance may require that portion of the storm building sewer between the lot line and public sewer or private interceptor sewer to be larger than 4 inches in diameter.

b. A gravity flow storm building sewer shall not be smaller than any storm building drain connected thereto, except a decrease in diameter in the direction of flow will be permitted if the increase in slope is sufficient to maintain the volume rate of flow. A reduction in diameter for the storm building sewer shall be made in a manhole.

2. Pressurized or forced sewers. Pressurized storm building sewers shall be not less than 1½ inches in diameter.

(6) *PITCH OF HORIZONTAL DRAIN PIPING.* All horizontal drain piping shall be installed at a pitch which will produce a computed velocity of at least one foot per second when flowing full.

(a) *Storm water drain piping.* The minimum pitch of horizontal drain piping shall be in accordance with Tables 82.36-1 to 82.36-4.

(b) *Clear water drain piping.* The minimum pitch of horizontal clear water drain piping less than 3 inches in diameter shall be 1/8 inch per foot. The minimum pitch of horizontal drain piping 3 inches or larger in diameter shall be 1/16 inch per foot.

(7) **CHANGES IN DIRECTION OF FLOW.** Changes in direction of flow for storm and clear water drain piping shall be in accordance with s. ILHR 82.30 (8).

(8) **DRAINAGE FITTINGS AND CONNECTIONS.** Drain piping fittings and connections shall be in accordance with s. ILHR 82.30 (9).

(9) **STACK OFFSETS.** Stack offsets in clear water drain piping shall comply with s. ILHR 82.30 (6).

(10) **FIXTURE BRANCH CONNECTIONS NEAR BASE OF STACK.** Branch drains from interior clear water inlets shall not connect downstream from the base fitting or fittings of a drain stack or conductor within the distance equal to 20 pipe diameters of the building drain.

(11) **SUMPS AND PUMPS.** (a) *Sumps.* 1. General. All storm building sub-drains shall discharge into a sump, the contents of which shall be automatically lifted and discharged into the storm drain system.

2. Construction and installation. The sump shall have a rim extending at least one inch above the floor immediately adjacent to the sump, except where the sump is installed in an exterior meter pit. The sump shall have a removable cover of sufficient strength for anticipated loads. The sump shall have a solid bottom.

3. Location. All sumps installed for the purpose of receiving clear water, basement or foundation drainage water shall be located at least 15 feet from any water well.

4. Size. The size of each clear water sump shall be as recommended by the sump pump manufacturer, but may not be smaller than 16 inches in diameter at the top, 14 inches in diameter at the bottom, and 22 inches in depth.

(b) *Sump pump systems.* 1. Pump size. The pump shall have a capacity appropriate for anticipated use.

2. Discharge piping. Where a sump discharges into a storm building drain or sewer, a free flow check valve shall be installed.

(12) **SUBSOIL DRAINS.** Where a subsoil drain for a building is subject to backwater, it shall be protected by an accessible backwater valve or a sump with pump. Subsoil drains may discharge into an area drain, drain tile receiver or a sump with pump.

(13) **STORM BUILDING DRAINS AND SEWERS.** The interior plumbing of each building shall be entirely separated and independent of any other building's plumbing. All storm drain systems shall be connected by means of independent connections with a public sewer or private interceptor main sewer. No storm building sewer may pass under or through a building to serve another building.

(a) *Extensions to grade.* 1. The connection of a storm water leader discharging to a storm building drain or storm building sewer shall be made

above the finished grade. That portion of the piping from the leader to at least one foot below grade shall be of cast iron.

2. The diameter of the drain piping connecting a storm water leader to a storm building drain or sewer shall be in accordance with sub. (5).

(b) *Other requirements.* 1. The elevation of storm building drains shall comply with s. ILHR 82.30 (11) (a) 1.

2. Storm building drains subject to backflow or backwater shall be protected in accordance with s. ILHR 82.30 (11) (a) 2.

3. The location of storm building drains and building sewers shall be in accordance with s. ILHR 82.30 (11) (c).

4. Storm building drains and building sewers shall be installed in accordance with s. ILHR 82.30 (11) (d).

5. Storm building sewers shall be connected to main sewers in accordance with s. ILHR 82.30 (11) (e).

(14) TRAPS FOR STORM AND CLEAR WATER BASES. (a) Traps shall be required for interior drain inlets receiving clear water wastes.

(b) Traps shall not be required for roof drains or exterior area drains for storm water waste, unless the drain inlet is located within 10 feet of an air inlet, door or openable window. Where a trap is required, the trap may be located inside the building. More than one drain inlet may discharge to the same trap.

(c) Where a subsoil drain discharges by gravity to a storm sewer the drain shall be trapped. Such a trap shall be provided with a cleanout.

(15) VENTS. (a) A trap receiving clear water wastes shall be vented in accordance with s. ILHR 82.31. Vent piping for a clear water drain system shall not be connected to a vent system serving a sanitary drain system or chemical waste system.

(b) Vents shall not be required for traps which receive only storm water or groundwater wastes.

(16) INTERIOR DRAIN INLETS. Interior clear water drain inlets shall terminate at least one inch above the finished floor.

(17) AREA DRAIN INLETS. (a) *Drain inlet design and construction.* 1. General. Storm water area drain inlets shall be constructed in a watertight and substantial manner of approved materials in accordance with ch. ILHR 84.

2. Inlet base. All site-constructed storm water area drain inlets subject to vehicular traffic shall be set on a 6 inch thick air-entrained concrete base with a minimum estimated compressive strength at 28 days of 3000 psi or on an approved precast concrete base.

3. Size. The size of masonry or concrete inlet basins shall be in accordance with subpars. a. and b.

a. Inlet basins 36 inches or less in depth shall have a minimum inside diameter of 24 inches. Basins shall be provided with an open bar grate not less than 18 inches in diameter.

b. Inlet basins with a depth greater than 36 inches shall have a minimum inside diameter of 36 inches. Basins shall be provided with an open bar grate not less than 24 inches in diameter.

4. Inlet grates. All inlets shall have an approved, well fitted, removable cast iron or steel grate of a thickness and strength to sustain anticipated loads. The grate shall have an available inlet area equal to or greater than the required waste outlet of the inlet.

Note: See Appendix for further explanatory material.

(b) *Subsurface areas of 50 square feet or less.* All subsurface areas, exposed to the weather, other than stairwells, with areas not exceeding 50 square feet shall be drained. These areas may drain to subsoil drains through a minimum 2 inch diameter pipe or a continuous layer of gravel or may drain to the storm building drain, storm subdrain, or storm sewer through a minimum 3 inch diameter pipe.

(c) *Subsurface areas of more than 50 square feet and stairwells.* An area drain shall be provided in subsurface areas, greater than 50 square feet in area, and all stairwells which are exposed to the weather. These areas shall be drained to the storm building drain, storm subdrain or storm sewer. If no storm sewer exists, the discharge shall be in accordance with sub. (3) (b). The fixture drain shall have a minimum inside diameter of 3 inches and shall not discharge into a subsoil, footing or foundation drain.

(18) **ROOF DRAINS.** (a) *General roofs.* Roof drains shall be equipped with strainers extending not less than 4 inches above the surface of the roof immediately adjacent to the roof drain. Strainers shall have an available inlet area above the roof of not less than 1½ times the area of the conductor to which the drain connects.

(b) *Flat decks.* Roof drain strainers for use on sun decks, parking decks and similar areas may be of the flat surface type level with the deck, and shall have an available inlet area of not less than twice the area of the conductor to which the drain connects.

(19) **CONTROLLED FLOW ROOF DRAIN SYSTEMS.** (a) *Application.* In lieu of sizing the roof storm drain piping on the basis of actual maximum horizontal projected roof areas as specified in sub. (4), the roof drain piping may be sized based on the equivalent adjusted maximum horizontal projected roof areas which result from controlled flow and storage of storm water on the roof.

Note: See s. ILHR 53.11 (4) (d) as to provisions relating to the structural design of the roof for controlled flow drain systems.

(b) *Installation.* Control of storm water runoff shall be by control devices. Control devices shall be protected by strainers.

(c) *Sizing.* Not less than 2 drains shall be installed in roof areas 10,000 square feet or less and at least 4 drains in roofs over 10,000 square feet in area.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. (3) (a) and (b) 1., (c) 1. and (11) (a) 4., cr. (3) (c) 3., Register, May, 1988, No. 389, eff. 6-1-88.

Subchapter IV

Water Supply Systems

ILHR 82.40 Water supply systems. (1) **SCOPE.** The provisions of this section set forth the requirements for the design and installation of water supply systems.

Note: Chapter NR 111 governs the design and construction of community water systems or waterworks.

(2) **MATERIALS.** All water supply systems shall be constructed of approved materials in accordance with ch. ILHR 84.

(3) **GENERAL.** (a) *Potable water required.* Every piece of equipment used in the preparation or processing of food, medical or pharmaceutical products and every plumbing fixture and appliance which demands a supply of water shall be provided with only potable water.

(b) *Hot water required.* Except as provided in subds. 1. and 2., hot water shall be provided to all plumbing fixtures, appliances and equipment used for personal washing, culinary purposes or laundering.

1. Lavatories, wash fountains and shower heads which are not located in dwelling units or living units shall be supplied with either tempered water or hot water.

a. Tempered water shall be provided to lavatories, wash fountains and shower heads by means of tempering mixing valves.

b. A single tempering mixing valve may serve no more than 4 lavatories and/or wash fountains which are located in the same room.

c. A single tempering mixing valve may serve only shower heads which are located in the same room.

2. Lavatories located in park shelters and bath houses which are not open during the period from November 15 to March 15 and which are not places of employment shall not be required to be provided with hot water.

3. Lavatories located in waysides which are not places of employment shall not be required to be provided with hot water.

Note: The exception of providing hot water under subds. 1. to 3. does not supercede the requirements of other state agencies for providing hot water.

(c) *Protection.* A water supply system shall be designed and installed in accordance with s. ILHR 82.41 and maintained to prevent nonpotable liquids, solids or gases from being introduced into the potable water supply system through cross connections.

(d) *Identification.* 1. Where a building or a structure is served by a nonpotable water distribution system and a potable water distribution system each distribution system shall be identified in accordance with this subdivision.

a. All above ground piping supplying nonpotable water shall be identified nonpotable by tags or yellow bands. The yellow bands shall be at least 3 inches wide.

b. All above ground piping supplying potable water shall be identified potable by tags or green bands. The green bands shall be at least 3 inches wide.

c. The tags or colored bands identifying nonpotable water and potable water piping shall be placed at intervals of not more than 25 feet and at each side where the piping passes through a wall, floor or roof.

d. All valves and outlets supplying nonpotable water shall be identified nonpotable by tags.

e. All valves, except fixture stop valves, supplying potable water shall be identified potable by tags.

f. Tags used to identify nonpotable water outlets, valves and piping shall be of metal or plastic in the shape of an equilateral triangle with 4 inch sides and bearing the legend "water unsafe" or other similar wording approved in writing by the department. The lettering on the tags shall be raised or indented and at least 1/2-inch in height.

g. Tags used to identify potable water valves shall be of metal or plastic in the shape of a 3-inch diameter circle bearing the legend "safe water" or other similar wording approved in writing by the department. The lettering on the tags shall be raised or indented and at least 1/2-inch in height.

2. Where a building or a structure is served by 2 distribution systems, one system supplied by a public water supply and the other system supplied by a private well, each water distribution system shall be identified to indicate the supply source.

(4) CONTROL VALVES. (a) *Private water mains.* Private water mains shall be provided with control valves as specified in this subsection.

1. Corporation cocks. a. If a private water main 2 inches or less in diameter connects to a public water main, a corporation cock shall be installed at the connection to the public water main.

b. If a private water main 2-1/2 inches or larger in diameter connects to a public water main, a corporation cock shall be installed not more than 8 feet from the connection to the public water main.

2. Curb stops. a. Except as provided in subpar. b., if a private water main connects to public water main, a curb stop shall be installed in the private water main between the corporation cock and the property line.

b. If a private water main 2-1/2 inches or larger in diameter connects to a public water main, one control valve may serve as the corporation cock and the curb stop. The control valve shall be located not more than 8 feet from the connection to the public water main and shall be accessible for operation.

(b) *Water services.* Water services shall be provided with control valves as specified in this subsection.

1. Corporation cocks. a. If a water service 2 inches or less in diameter connects to a public water main, a corporation cock shall be installed at the connection to the public water main.

b. If a water service 2-1/2 inches or larger in diameter connects to a public water main, a corporation cock shall be installed not more than 8 feet from the connection to the public water main.

2. Curb stops. a. Except for water services serving farm buildings and farm houses, a curb stop shall be installed in each water service which connects to a private water main. The curb stop shall be located outside the building served by the water service.

b. Except as provided in subpar. c., a curb stop shall be installed in each water service which connects to a public water main. The curb stop shall be located between the corporation cock and the property line.

c. If a water service 2-1/2 inches or larger in diameter connects to a public water main, one control valve may serve as the corporation cock and the curb stop. The control valve shall be located not more than 8 feet from the connection to a public water main and shall be accessible for operation.

3. Building control valves. If a water service serves a building, a building control valve shall be provided in the water service as specified in this subsection.

a. If the water service connects to a public water supply or to a private water supply which has an external pressure tank, the building control valve shall be installed inside the building and located within 3 feet of developed length from the point where the water service first enters the building. If a water meter is provided, the building control valve shall be located upstream of the water meter.

b. If a private water supply includes an internal pressure tank, the building control valve shall be installed inside the building and located within 3 feet of developed length downstream from the internal pressure tank.

Note: See Appendix for further explanatory material.

(c) *Water distribution systems.* 1. Control valves shall be installed in water distribution systems serving public buildings as specified in this subdivision.

a. Water meters. If a water meter is provided, a control valve shall be installed within 3 feet of developed length downstream from the outlet of the water meter. If bypass piping is provided around a water meter, a control valve shall be installed in the bypass piping.

Note: See sub. (8) (d) 3. for the requirements relating to the bypassing of water meters.

b. Fixtures and appliances. A control valve shall be installed in the supply piping to each water heater and water treatment device and in the fixture supply to each plumbing fixture, plumbing appliance and piece of equipment.

c. Hot water circulation systems. If a hot water circulation system is provided, a control valve shall be installed on both the inlet and outlet piping to the circulation pump. If a hot water circulation system has 2 or more return pipe lines, a balancing control valve shall be installed in each return piping line.

d. Dwelling units and living units. The water distribution system for buildings with more than 4 dwelling units or living units shall be pro-

vided with control valves in such numbers and at such locations so that the water supplied to all the units within the building can be isolated into groups of 4 or less units.

Note: See sub. (8) (g) for the valve requirements for water temperature control.

2. Control valves shall be installed in water distribution systems serving one- and 2-family dwellings as specified in this subdivision.

a. Water meters. If a water meter is provided, a control valve shall be installed within 3 feet of developed length downstream from the outlet of the water meter. If bypass piping is provided around a water meter, a control valve shall be installed in the bypass piping.

Note: See sub. (8) (d) 3. for the requirements relating to the bypassing of water meters.

b. Fixtures and appliances. A control valve shall be installed in the supply piping to each water heater and water treatment device and in the fixture supply to each water closet, exterior hose bibb, plumbing appliance and piece of equipment.

c. Hot water circulation systems. If a hot water circulation system is provided, a control valve shall be installed on both the inlet and outlet piping to the circulation pump. If a hot water circulation system has 2 or more return pipe lines, a balancing control valve shall be installed in each return piping line.

(5) HOT WATER SUPPLY SYSTEMS. (a) *General*. Water heating systems shall be sized to provide sufficient hot water to supply both the daily requirements and hourly peak loads of the building.

(b) *Temperature maintenance*. If the developed length of hot water distribution piping from the source of the hot water supply to a plumbing fixture or appliance exceeds 100 feet, a circulation system or self-regulating electric heating cable shall be provided to maintain the temperature of the hot water within the distribution piping.

1. If a circulation system is used to maintain the temperature, no un-circulated hot water distribution piping may exceed 25 feet in developed length.

2. If a self-regulating electric heating cable is used to maintain the temperature, the cable shall extend to within 25 feet of each fixture or the appliance.

3. Water distribution piping conveying circulated water or served by a self-regulating electric heating cable shall be insulated to limit the heat loss at the external surface of the pipe insulation to a maximum of 25 BTUs per hour per square foot for aboveground piping and 35 BTUs per hour per square foot for underground piping. The maximum heat loss shall be determined at a temperature differential, T , equal to the maximum water temperature minus a design ambient temperature no higher than 65°F.

4. Water distribution piping served by self-regulating electric heating cable shall be identified as being electrically traced in accordance with ch. ILHR 16.

5. The installation of self-regulating electric heating cable may be subcontracted by a plumber to another trade.

(c) *Water heaters.* All water heaters and safety devices shall be designed and constructed in accordance with s. ILHR 84.20 (5) (n).

Note: Water heaters are to be installed in accordance with the requirements specified in chs. ILHR 50 to 64 and ILHR 20 to 25 with respect to enclosures and venting.

(d) *Safety devices.* Water heaters shall be equipped with safety devices as specified in this paragraph.

1. All pressurized storage-type water heaters and unfired hot water storage tanks shall be equipped with one or more combination temperature and pressure relief valves. The temperature steam rating of a combination temperature and pressure relief valve or valves shall equal or exceed the energy input rating in BTU per hour of the water heater. No shut off valve or other restricting device may be installed between the water heater or storage tank and the combination temperature and pressure relief valve.

2. All pressurized non-storage type water heaters shall be provided with a pressure relief valve installed at the hot water outlet with no shut off valve between the heater and the relief valve.

3. Temperature and pressure relief valves shall be installed so that the sensing element of the valve extends into the heater or tank and monitors the temperature in the top 6 inches of the heater or tank.

4. A vacuum relief valve shall be installed in each water heater and hot water storage tank which, when measured from the bottom of the heater or tank, is located more than 20 feet above any faucet or outlet served by the heater or tank.

5. Every relief valve which is designed to discharge water or steam shall be connected to a discharge pipe.

a. The discharge pipe and fittings shall be made of a material acceptable for water distribution piping in accordance with s. ILHR 84.30 (4) (b) 1.

b. The discharge pipe and fittings shall have a diameter not less than the diameter of the relief valve outlet.

c. The discharge pipe may not be trapped.

d. No valve may be installed in the discharge pipe.

e. The discharge pipe shall be installed to drain by gravity flow to a floor served by a floor drain or to a receptor in accordance with s. ILHR 82.33 (8). The outlet of the discharge pipe shall terminate within 6 inches over the floor or receptor, but not less than a distance equal to twice the diameter of the outlet pipe. The outlet of the discharge pipe may not be threaded.

f. The discharge pipe for a water heater shall terminate within the same room or enclosure within which the water heater or hot water storage tank is located.

(e) *Controls.* 1. All hot water supply systems shall be equipped with automatic temperature controls capable of adjustments from the lowest to the highest acceptable temperature settings for the intended use.

2. A separate means shall be provided to terminate the energy supplied to each water heater and each hot water circulation system.

(6) **LOAD FACTORS FOR WATER SUPPLY SYSTEMS.** (a) *Intermittent flow fixtures.* The load factor for intermittent flow fixtures on water supply piping shall be computed in terms of water supply fixture units as specified in Tables 82.40-1 and 82.40-2 for the corresponding fixture and use. Water supply fixture units may be converted to gallons per minute in accordance with Table 82.40-3.

(b) *Continuous flow devices.* The load factor for equipment which demands a continuous flow of water shall be computed on the basis of anticipated flow rate in terms of gallons per minute.

Table 82.40-1
WATER SUPPLY FIXTURES UNITS FOR NONPUBLIC USE FIXTURES

TYPE OF FIXTURE ^a	WATER SUPPLY FIXTURE UNITS (WSFU)		
	Hot	Cold	Total
Automatic Clothes Washer	1.0	1.0	1.5
Bar Sink	0.5	0.5	1.0
Bathtub, with or without Shower Head	1.5	1.5	2.0
Bidet	1.0	1.0	1.5
Dishwashing Machine	1.0		1.0
Glass Filler		0.5	0.5
Hose Bibb:			
1/2" diameter		3.0	3.0
3/4" diameter		4.0	4.0
Kitchen Sink	1.0	1.0	1.5
Laundry Tray, 1 or 2 Compartment	1.0	1.0	1.5
Lavatory	0.5	0.5	1.0
Shower, Per Head	1.0	1.0	1.5
Water Closet, Flushometer Type		6.0	6.0
Water Closet, Gravity Type Flush Tank		2.0	2.0
Bathroom Groups:			
Bathtub, Lavatory and Water Closet-FM ^b	2.0	7.5	8.0
Bathtub, Lavatory and Water Closet-FT ^c	2.0	3.5	4.0
Shower Stall, Lavatory and Water Closet-FM	1.5	7.0	7.5
Shower Stall, Lavatory and Water Closet-FT	1.5	3.0	3.5

Note a: For fixtures not listed, factors may be assumed by comparing the fixture to a listed fixture which uses water in similar quantities and at similar rates.

Note b: FM means flushometer type.

Note c: FT means flush tank type.

Table 82.40-2
WATER SUPPLY FIXTURE UNITS FOR PUBLIC USE FIXTURES

TYPE OF FIXTURE ^a	WATER SUPPLY FIXTURE UNITS (WSFU)		
	Hot	Cold	Total
Automatic Clothes Washer, Individual	2.0	2.0	3.0
Automatic Clothes Washer, Large Capacity	b	b	b
Bathtub, With or Without Shower Head	2.0	2.0	3.0
Coffeemaker		0.5	0.5
Dishwasher, Commercial	b	b	b
Drink Dispenser		0.5	0.5
Drinking Fountain		0.25	0.25
Glass Filler		0.5	0.5
Hose Bibb:			
1/2" diameter		3.0	3.0
3/4" diameter		4.0	4.0
Icemaker		0.5	0.5
Lavatory	0.5	0.5	1.0
Shower, Per Head	2.0	2.0	3.0
Sinks:			
Bar and Fountain	1.5	1.5	2.0
Barber and Shampoo	1.5	1.5	2.0
Cup		0.5	0.5
Flushing Rim		7.0	7.0
Kitchen and Food Preparation per faucet	2.0	2.0	3.0
Laboratory	1.0	1.0	1.5
Medical Exam and Treatment	1.0	1.0	1.5
Service	2.0	2.0	3.0
Surgeon Washup	1.5	1.5	2.0
Urinal:			
Syphon Jet		4.0	4.0
Washdown		2.0	2.0
Wall Hydrant, Hot and Cold Mix:			
1/2" diameter	2.0	2.0	3.0
3/4" diameter	3.0	3.0	4.0
Wash Fountain:			
Semicircular	1.5	1.5	2.0
Circular	2.0	2.0	3.0
Water Closet:			
Flushometer		7.0	7.0
Gravity Type Flush Tank		3.0	3.0

Note a: For fixtures not listed, factors may be assumed by comparing the fixture to a listed fixture which uses water in similar quantities and at similar rates.

Note b: Load factors in gallons per minute, gpm, based on manufacturer's requirements.

Table 82.40-3

CONVERSION OF WATER SUPPLY FIXTURE UNITS TO GALLONS PER MINUTE

Water Supply Fixture Units	GALLONS PER MINUTE	
	Predominately Flushometer Type Water Closets or Syphon Jet Urinals	Predominately Flush Tank Type Water Closets or Washdown Urinals
1	—	1
2	—	2
3	—	3
4	10	4
5	15	4.5
6	18	5
7	21	6
8	24	6.5
9	26	7
10	27	8
20	35	14
30	40	20
40	46	24
50	51	28
60	54	32
70	58	35
80	62	38
90	65	41
100	68	42
120	73	48
140	78	53
160	83	57
180	87	61
200	92	65
250	101	75
300	110	85
400	126	105
500	142	125
600	157	143
700	170	161
800	183	178
900	197	195
1000	208	208
1250	240	240
1500	267	267
1750	294	294
2000	321	321
2250	348	348
2500	375	375
2750	402	402
3000	432	432
4000	525	525
5000	593	593

Note: Values not specified in the table may be calculated by interpolation.

(7) SIZING OF WATER SUPPLY PIPING. The sizing of the water supply system shall be based on the empirical method and limitations outlined Register, May, 1988, No. 389

in this subsection or on a detailed engineering analysis acceptable to the department.

(a) *Methodology.* The determination of minimum pipe sizes shall take into account the pressure losses which occur throughout the entire water supply system and the flow velocities within the water distribution system. Calculations for sizing a water distribution system shall include:

1. The load factor in water supply fixture units or gallons per minute on the piping;
2. The minimum pressure available from the water main or pressure tank;
3. The pressure loss due to the differences in elevation from the:
 - a. Water main or pressure tank to the building control valve; and
 - b. Building control valve to the controlling plumbing fixture;
4. The pressure losses due to flow through water heaters, water treatment devices, water meters and backflow preventers;
5. The minimum flow pressure needed at the controlling plumbing fixture; and
6. The pressure losses due to flow friction through piping, fittings, valves and other plumbing appurtenances. This pressure loss may be calculated in terms of equivalent lengths of piping. The equivalent length of piping to a controlling plumbing fixture, including fittings, valves and other appurtenances, may be obtained by multiplying the developed length by 1.5.

Note: See Appendix for further explanatory material.

(b) *Private water mains and water services.* Private water mains and water services shall be designed to supply water to the water distribution systems to maintain the minimum flow pressures specified in par. (d), but shall not be less than 3/4 inch in diameter.

Note: See Appendix for further explanatory material.

(c) *Maximum loading.* The calculated load on any portion of the water distribution system may not exceed the limits specified in Tables 82.40-4 to 82.40-8.

(d) *Pressure.* 1. Except as provided in subpars. a. to c., water supply systems shall be designed to provide at least 8 psig of flow pressure at the outlets of all fixture supplies.

a. The flow pressure at the outlets of the fixture supplies serving syphonic type urinals, washdown type urinals and water closets, and syphonic type flushometer water closets shall be at least 15 psig.

b. The flow pressure at the outlets of the fixture supplies serving one piece tank type water closets, pressure balance mixing valves, and thermostatic mixing valves shall be at least 20 psig.

c. The flow pressure at the outlets of the fixture supplies serving blow-out type urinals and blowout type water closets shall be at least 25 psig.

2. a. Except as provided in subd. 3., if the water pressure available from a water main or private water supply exceeds 80 psig, a pressure reducing valve and strainer, if a strainer is not a component of the valve, shall be installed in the water distribution system.

b. A pressure reducing valve required under subpar. a. shall be installed upstream from all plumbing fixtures and plumbing appliances and downstream from the water meter of an utility, if a meter is provided.

3. A pressure reducing valve shall not be required to be installed in a water distribution system which supplies water directly to a water pressure booster pump.

4. If the pressure available from the water main or private water supply is inadequate by calculation to provide the minimum pressures specified in subd. 1., a hydropneumatic pressure booster system or a water pressure booster pump shall be installed to increase the supply of water.

a. Each water pressure booster pump shall be provided with an automatic low pressure cut-off switch. The cut-off switch shall be located on the inlet side of the pump and shall be set to terminate the energy supplied to the pump when a positive pressure of less than 10 psig occurs.

b. A vacuum relief valve not less than one-half inch in diameter shall be installed in each water pressure tank, if the bottom of the pressure tank is more than 20 feet above any water supply outlet served by the pressure tank.

(e) *Maximum velocity.* A water distribution system shall be designed so that the flow velocity does not exceed 8 feet per second.

(f) *Minimum sizes.* 1. Water distribution piping 1/2 inch in diameter serving 2 or more plumbing fixtures may not have a load of more than 2 water supply fixture units.

2. Water distribution piping 1/2 inch in diameter serving a shower which is not individually pressure balanced or individually thermostatically blended may not serve any additional fixtures.

(g) *Minimum sizes for fixture supplies.* Except as provided in subds. 1. to 3., the fixture supplies serving all plumbing fixtures, appliances and pieces of equipment shall be at least 1/2 inch in diameter.

1. Fixture supplies serving syphon jet type urinals shall be at least 3/4 inch in diameter.

2. Fixture supplies serving flushometer type water closets shall be at least one inch in diameter.

3. Fixture supplies serving emergency eye wash or shower outlets shall be not less than recommended by the manufacturer.

(h) *Maximum lengths for fixture supply connectors.* 1. Fixture supply connectors may not exceed more than 24 inches in developed length from a plumbing fixture or the body of a faucet.

2. Fixture supply connectors may not extend more than 10 feet in developed length from a plumbing appliance.

(8) **INSTALLATION.** (a) *Frost protection.* Adequate measures shall be taken to protect all portions of the water supply system from freezing. All private water mains and water services shall be installed below the predicted depths of frost specified in s. ILHR 82.30 (11) (a) 2. d., Figure 82.30-1 and Table 82.30-6, unless other protective measures from freezing are taken.

(b) *Location.* 1. Water supply piping may not be located in, under or above sanitary sewer manholes, septic tanks, holding tanks, soil absorption areas or seepage pits for private sewage systems.

2. Water supply piping shall be located at least 10 feet horizontally away from a septic tank or soil absorption area for a private sewage system.

3. Water supply piping located downslope from a mound type private sewage system shall be at 25 feet horizontally away from the toe of the basal area.

Note: See also s. ILHR 84.30 (4) relative to water supply piping to be installed in contaminated soils.

(c) *Private water mains and water services.* Private water mains and water services shall be installed in accordance with this paragraph.

1. No private water main or water service may pass under or through a building to serve another building.

2. If a private water main or a water service crosses a sanitary sewer, the water piping within 10 feet of the point of crossing shall be installed:

a. At least 12 inches above the top of the sewer from the bottom of the water piping;

b. At least 18 inches below the bottom of the sewer from the top of the water piping; or

c. Within a waterproof sleeve made of materials as specified for sanitary building sewers in s. ILHR 84.30 (1).

3. Private water mains and water services 2-1/2 inches or larger in diameter shall be installed at least 8 feet horizontally from any sanitary sewer. The distance shall be measured from center to center of the piping.

4. Except as provided in subd. 5., private water mains and water services 2 inches or less in diameter shall be installed at least 30 inches horizontally from any sanitary sewer. The distance shall be measured from center to center of the piping.

5. Private water mains and water services 2 inches or less in diameter may be installed less than 30 inches horizontally from a sanitary sewer, if the bottom of the water piping is installed at least 12 inches above the sewer, except that portion of a water service within 5 feet of developed length from the point where the water service first enters the building may be less than 12 inches above the sewer.

6. No private water main or water service may be installed within 6 inches of a storm sewer.

(d) *Water distribution piping.* 1. Water distribution piping shall be supported in accordance with s. ILHR 82.60.

2. Provisions shall be made to evacuate all water out of the water distribution system.

3. Except where parallel water meters are installed, water distribution piping shall be provided to bypass a water meter 1-1/2 inches or larger.

4. Water distribution piping shall be provided to bypass a water softener and an iron removal device. The bypass piping may be an internal part of the water softener or the iron removal device.

(e) *Valves.* 1. All control valves installed in a water service, except a valve serving only as a corporation cock, shall be accessible.

2. Stop and waste-type control valves may not be installed underground.

3. All control valves and fixture stop valves installed in a water distribution system shall be accessible. Control valves for the individual plumbing fixtures and appliances within dwelling units shall be accessible from within the dwelling unit.

(f) *Water hammer arrestors.* All plumbing fixtures, appliances and appurtenances with 3/8 inch or larger inlet openings and with solenoid actuated quick closing valves shall be provided with water hammer arrestors. Water hammer arrestors shall be installed in the fixture supplies serving the fixtures, appliances or appurtenances. Water hammer arrestors shall be accessible.

(g) *Temperature control.* The water temperature to all showers in public buildings shall be controlled by thermostatic mixing valves or by individually controlled pressure balanced mixing valves.

(h) *Fittings and connections.* The drilling and tapping of water supply piping shall be prohibited except for:

1. Corporation cocks for a water service or a private water main; and
2. Self-tapping valves which serve individual plumbing appliances.

(i) *Flushing and disinfection of potable water supply systems.* 1. a. Before a newly constructed water supply system is to be put into use, the piping of the system shall be filled with water and allowed to stand for at least 24 hours. After 24 hours each water outlet shall be flushed beginning with the outlet closest to the building control valve and then each successive outlet in the system. The flushing at each water outlet shall continue for at least one minute and until the water appears clear at the outlet.

b. Each portion of a water supply system which is altered or repaired shall be flushed for at least one minute and until the water appears clear.

2. New private water mains and extensions to private water mains shall be disinfected prior to use in accordance with AWWA C601 or the following method:

a. The pipe system shall be flushed with clean water until no dirty water appears at the points of outlet.

b. The system or part thereof shall be filled with a solution of water and chlorine containing at least 50 parts per million of chlorine and the system or part thereof shall be valved off and allowed to stand for 24 hours or the system or part thereof shall be filled with a solution of water and chlorine containing at least 200 parts per million of chlorine and allowed to stand for 3 hours.

c. Following the allowed standing time, the system shall be flushed with clean potable water.

d. The procedures shall be repeated if it is shown by a bacteriological examination that contamination still exists in the system.

3. The department may require a water quality analysis to be done for a new or repaired water supply system. The analysis shall be performed in accordance with acceptable nationally recognized laboratory practices. If the water supply system has been disinfected, water samples for the analysis may not be taken sooner than 24 hours after disinfection.

Note: See s. ILHR 84.30 (1) regarding the bending of pipe and protection from puncture.

(9) PIPING BY PLUMBER. In accordance with ch. 145, Stats., piping which conveys water for human use or consumption, or to plumbing fixtures and plumbing appliances of every description, shall be installed by persons licensed by the department.

(a) Private water mains and water services shall be installed by persons licensed by the department as a plumber or utility contractor.

(b) Water distribution piping shall be installed by persons licensed by the department as a plumber.

(c) Except for automatic fire sprinkler systems, piping or piping systems, which may include water heating or water treatment equipment, and which convey water not for human use or consumption from a water distribution system to water using equipment, are not required to be installed by persons licensed by the department.

(d) Where a pipe or piping system, which conveys water not for human use or consumption, connects to a water distribution system, that connection shall be provided with an approved means of backflow prevention in accordance with s. ILHR 82.41. The means of backflow prevention shall be installed by persons licensed by the department as a plumber.

Table 82.40-4

MAXIMUM ALLOWABLE LOAD FOR COPPER TUBE - TYPE K, ASIM B88

Pressure Loss Due to Fric- tion (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																										
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"			2 1/2"			3"			4"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	-	-	-	0.5	-	0.5	3.0	-	3.0	5.0	-	6.0	9.0	-	12.0	18.0	6.0	27.0	31.0	15.0	57.0	51.0	50.0	132	110	300	425
1	-	-	-	2.0	-	2.0	4.0	-	4.0	8.0	-	10.0	13.0	4.5	18.0	27.0	10.0	47.0	48.0	44.0	120	75.0	128	250	160	620	695
2	0.5	-	0.5	3.0	-	3.0	6.5	-	8.0	12.0	4.0	17.0	18.0	6.0	27.0	39.0	26.0	83.0	70.0	108	225	110	300	425	230		1180
3	1.0	-	1.0	4.0	-	4.0	8.0	-	10.0	15.0	5.0	22.0	23.0	7.5	38.0	50.0	48.0	128	85.0	170	300	140	485	580	280		1630
4	1.5	-	1.5	4.0	-	4.0	9.0	-	12.0	17.0	5.5	25.0	27.0	10.0	47.0	56.0	65.0	154	100	245	375	160	620	695			NP
5	2.0	-	2.0	5.0	-	6.0	11.0	4.0	15.0	19.0	6.0	28.5	31.0	15.0	57.0	65.0	90.0	200	115	335	450						
6	2.0	-	2.0	5.5	-	6.5	12.0	4.0	17.0	21.0	7.0	32.0	34.0	19.0	67.0	70.0	108	225									
7	2.5	-	2.5	6.0	-	7.0	13.0	4.5	18.0	23.0	7.5	38.0	37.0	23.0	77.0	73.0	120	240									
8	2.5	-	2.5	6.5	-	8.0	14.0	4.5	20.0	25.0	8.5	43.0	40.0	27.0	87.0												
9	3.0	-	3.0	7.0	-	9.0	15.0	5.0	22.0	27.0	10.0	47.0	42.0	30.0	100												
10	3.0	-	3.0	7.5	-	9.5	16.0	5.0	23.0	28.0	11.0	50.0															
11	3.0	-	3.0	7.5	-	9.5	17.0	5.5	25.0	30.0	14.0	55.0															
12	3.5	-	3.5	8.0	-	10.0	18.0	6.0	27.0																		
13	3.5	-	3.5	8.5	-	11.0	19.0	6.0	28.5																		
14	3.5	-	3.5	9.0	-	12.0	20.0	6.5	30.0																		
15	3.5	-	3.5	9.0	-	12.0																					
16	3.5	-	3.5	9.5	-	12.5																					
17	4.0	-	4.0	9.5	-	12.5																					
18	4.0	-	4.0	10.0	4.0	13.0																					
19	4.0	-	4.0	10.5	4.0	14.0																					
20	4.0	-	4.0	11.0	4.0	15.0																					
21	4.5	-	5.0																								
22	4.5	-	5.0																								
23	4.5	-	5.0																								
24	4.5	-	5.0																								
25	5.0	-	6.0																								
26	5.0	-	6.0																								
27	5.0	-	6.0																								
28	5.0	-	6.0																								
29	5.5	-	6.5																								
30	5.5	-	6.5																								
	NP																										

Notes: WSFU means water supply fixture units.
GPM means - gallons per minute.
FM means - predominately flushometer type water closets or syphon jet urinals.
FT means - predominately flush tank type water closets or washdown urinals.
NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

IIHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Notes: WSFU means water supply fixture units.

GPM means - gallons per minute.

FM means - predominately flushometer type water closets or syphon jet urinals.

FT means - predominately flush tank type water closets or washdown urinals.

NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Table 82.40-5
MAXIMUM ALLOWABLE LOAD FOR COPPER TUBE - TYPE L, ASTM B88

Pressure Loss Due to Fric- tion (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																							
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"			2 1/2"			3"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	-	-	-	1.0	-	1.0	3.0	-	3.0	6.0	-	7.0	9.0	-	12.0	19.0	6.0	28.5	34.0	19.0	67.0	54.0	60.0	144
1	-	-	-	2.5	-	2.5	5.0	-	6.0	8.0	-	10.0	13.0	4.5	18.0	28.0	11.0	50.0	50.0	48.0	128	77.0	136	260
2	0.5	-	0.5	3.5	-	3.5	7.0	-	9.0	12.0	4.0	17.0	19.0	6.0	28.5	41.0	28.0	90.0	72.0	116	235	115	335	450
3	1.5	-	1.5	4.5	-	5.0	9.0	-	12.0	15.0	5.0	22.0	24.0	8.0	40.0	51.0	50.0	132	90.0	192	325	144	515	605
4	2.0	-	2.0	5.0	-	6.0	10.0	4.0	13.0	18.0	6.0	27.0	29.0	12.0	52.0	60.0	75.0	174	105	270	400	170	700	700
5	2.0	-	2.0	5.5	-	6.5	12.0	4.0	17.0	21.0	7.0	32.0	33.0	17.0	63.0	67.0	97.0	210	120	365	475	NP		
6	2.5	-	2.5	6.5	-	8.0	13.0	4.5	18.0	23.0	7.5	38.0	36.0	22.0	73.0	75.0	128	250	NP			NP		
7	2.5	-	2.5	7.0	-	9.0	14.0	4.5	20.0	25.0	8.5	43.0	39.0	26.0	83.0	NP			NP			NP		
8	3.0	-	3.0	7.5	-	9.5	15.0	5.0	22.0	26.0	9.0	45.0	42.0	30.0	100	NP			NP			NP		
9	3.0	-	3.0	8.0	-	10.0	16.0	5.0	23.0	28.0	11.0	50.0	45.0	37.0	110	NP			NP			NP		
10	3.0	-	3.0	8.5	-	11.0	17.0	5.5	25.0	30.0	13.5	55.0	NP			NP			NP			NP		
11	3.5	-	3.5	9.0	-	12.0	18.0	6.0	27.0	32.0	16.0	60.0	NP			NP			NP			NP		
12	3.5	-	3.5	9.0	-	12.0	19.0	6.0	28.5	NP			NP			NP			NP			NP		
13	3.5	-	3.5	9.5	-	12.5	20.0	6.5	30.0	NP			NP			NP			NP			NP		
14	4.0	-	4.0	10.0	4.0	13.0	21.0	7.0	32.0	NP			NP			NP			NP			NP		
15	4.0	-	4.0	10.5	4.0	14.0	NP			NP			NP			NP			NP			NP		
16	4.0	-	4.0	11.0	4.0	15.0	NP			NP			NP			NP			NP			NP		
17	4.5	-	5.0	11.5	4.0	16.0	NP			NP			NP			NP			NP			NP		
18	4.5	-	5.0	12.0	4.0	17.0	NP			NP			NP			NP			NP			NP		
19	4.5	-	5.0	12.0	4.0	17.0	NP			NP			NP			NP			NP			NP		
20	4.5	-	5.0	NP			NP			NP			NP			NP			NP			NP		
21	5.0	-	6.0	NP			NP			NP			NP			NP			NP			NP		
22	5.0	-	6.0	NP			NP			NP			NP			NP			NP			NP		
23	5.0	-	6.0	NP			NP			NP			NP			NP			NP			NP		
24	5.0	-	6.0	NP			NP			NP			NP			NP			NP			NP		
25	5.5	-	6.5	NP			NP			NP			NP			NP			NP			NP		
26	5.5	-	6.5	NP			NP			NP			NP			NP			NP			NP		
27	5.5	-	6.5	NP			NP			NP			NP			NP			NP			NP		
28	6.0	-	7.0	NP			NP			NP			NP			NP			NP			NP		
29	6.0	-	7.0	NP			NP			NP			NP			NP			NP			NP		
	NP			NP			NP			NP			NP			NP			NP			NP		

Note: WSFU means water supply fixture units.

GPM means - gallons per minute.

FM means - predominately flushometer type water closets or syphon jet urinals.

FT means - predominately flush tank type water closets or washdown urinals.

NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

IIHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Table 82.40-6

MAXIMUM ALLOWABLE LOAD FOR COPPER TUBE - TYPE M, -ASIM B88

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																										
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"			2 1/2"			3"			4"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	-	-	-	1.5	-	1.5	3.5	-	3.5	6.0	-	7.0	9.5	-	12.5	20.0	6.5	30.0	34.0	19.0	67.0	56.0	65.0	154	115	334	450
1	-	-	-	3.0	-	3.0	6.0	-	6.0	9.0	-	12.0	14.0	4.5	20.0	29.0	12.0	52.0	50.0	48.0	128	80.0	148	275	170	700	150
2	1.0	-	1.0	4.0	-	4.0	7.5	-	9.5	13.0	4.5	18.0	20.0	6.5	30.0	42.0	30.0	100	75.0	128	250	120	365	475	250	1350	
3	1.5	-	1.5	5.0	-	6.0	9.5	-	12.5	16.0	5.0	23.0	25.0	8.5	42.0	52.0	53.0	136	93.0	205	340	150	555	640	280	1630	
4	2.0	-	2.0	5.5	-	6.5	11.0	4.0	15.0	19.0	6.0	28.5	30.0	13.5	55.0	62.0	80.0	184	110	300	425	175	740	780	NP		
5	2.5	-	2.5	6.5	-	8.0	12.5	4.5	17.5	22.0	7.0	35.0	34.0	19.0	67.0	70.0	108	225	120	365	475	NP					
6	2.5	-	2.5	7.0	-	9.0	14.0	4.5	20.0	24.0	8.0	40.0	37.0	23.0	77.0	77.0	136	260	NP								
7	3.0	-	3.0	7.5	-	9.5	15.0	5.0	22.0	26.0	9.0	45.0	40.0	27.0	87.0	80.0	148	275									
8	3.5	-	3.5	8.0	-	10.0	16.0	5.0	23.0	28.0	11.0	50.0	44.0	35.0	107	NP											
9	3.5	-	3.5	8.5	-	11.0	17.0	5.5	25.0	30.0	13.5	55.0	46.0	40.0	113												
10	3.5	-	3.5	9.5	-	12.5	18.0	6.0	27.0	31.0	15.0	57.0	NP														
11	4.0	-	4.0	10.0	4.0	13.0	19.0	6.0	28.0	32.0	16.0	60.0															
12	4.0	-	4.0	10.0	4.0	13.0	20.0	6.5	30.0	NP																	
13	4.0	-	4.0	10.5	4.0	14.0	21.0	7.0	32.0																		
14	4.5	-	5.0	11.0	4.0	15.0	NP																				
15	4.5	-	5.0	11.5	4.0	16.0																					
16	4.5	-	5.0	12.0	4.0	17.0																					
17	5.0	-	6.0	12.5	4.5	17.5																					
18	5.0	-	6.0	13.0	4.5	18.0																					
19	5.0	-	6.0	NP																							
20	5.5	-	6.5																								
21	5.5	-	6.5																								
22	5.5	-	6.5																								
23	5.5	-	6.5																								
24	6.0	-	7.0																								
25	6.0	-	7.0																								
26	6.0	-	7.0																								
27	6.0	-	7.0																								
28	6.5	-	8.0																								
	NP																										

Notes: WSFU means water supply fixture units.
GPM means - gallons per minute.
FM means - predominately flushometer type water closets or syphon jet urinals.
FT means - predominately flush tank type water closets or washdown urinals.
NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Notes: WSFU means water supply fixture units.

GPM means - gallons per minute.

FM means - predominately flushometer type water closets or syphon jet urinals.

FT means - predominately flush tank type water closets or washdown urinals.

NP means - not pennitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Table 82.40-7
ALLOWABLE MAXIMUM LOAD FOR GALVANIZED STEEL PIPE, SCHEDULE 40
ASIM A53 and ASIM 120

Pressure Loss Due to Fric- tion (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																										
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"			2 1/2"			3"			4"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	-	-	-	1.5	-	1.5	3.5	-	3.5	7.0	-	9.0	11.0	4.0	15.0	21.0	7.0	32.0	34.0	19.0	67.0	60.0	75.0	175	122	375	485
1	0.5	-	0.5	2.5	-	2.5	5.0	-	6.0	10.5	4.0	14.0	16.0	5.0	23.0	30.0	14.0	55.0	49.0	46.0	124	87.0	180	310	180	770	810
2	2.0	-	2.0	4.0	-	4.0	7.5	-	9.5	15.5	5.0	22.5	23.0	7.5	37.0	45.0	37.0	110	72.0	116	235	127	405	510	260	1440	
3	2.5	-	2.5	5.0	-	6.0	9.5	-	12.5	19.0	6.0	28.5	29.0	12.0	52.0	55.0	62.0	150	90.0	192	325	160	615	695	285	1660	
4	2.5	-	2.5	5.5	-	6.5	11.0	4.0	15.0	22.0	7.0	35.0	34.0	19.0	67.0	65.0	90.0	200	105	270	400	180	770	810	NP		
5	3.0	-	3.0	6.5	-	8.0	12.5	4.5	17.5	25.0	8.5	42.0	39.0	26.0	83.0	73.0	120	240	120	365	475	NP					
6	3.5	-	3.5	7.5	-	9.5	14.0	4.5	20.0	28.0	11.0	50.0	43.0	32.0	103	81.0	152	280	NP								
7	3.5	-	3.5	8.0	-	10.0	15.0	5.0	22.0	31.0	15.0	57.0	46.0	40.0	113	NP											
8	4.0	-	4.0	8.5	-	11.0	16.0	5.0	23.0	33.0	17.0	63.0	50.0	48.0	128												
9	4.0	-	4.0	9.0	-	12.0	17.0	5.5	25.0	35.0	20.0	70.0	NP														
10	4.5	-	5.0	9.5	-	12.5	18.0	6.0	27.0	37.0	23.0	77.0															
11	5.0	-	6.0	10.0	4.0	13.0	19.0	6.0	28.5	NP																	
12	5.0	-	6.0	10.5	4.0	14.0	20.0	6.5	30.0																		
13	5.0	-	6.0	11.0	4.0	15.0	21.0	7.0	32.0																		
14	5.5	-	6.5	11.5	4.0	16.0	NP																				
15	6.0	-	7.0	12.0	4.0	17.0																					
16	6.0	-	7.0	12.5	4.5	17.5																					
17	6.0	-	7.0	13.0	4.5	18.0																					
18	6.0	-	7.0	13.5	4.5	19.0																					
19	6.5	-	8.0	NP																							
20	6.5	-	8.0																								
21	7.0	-	9.0																								
22	7.0	-	9.0																								
23	7.0	-	9.0																								
24	7.5	-	9.5																								
25	7.5	-	9.5																								
	NP																										

Note: WSFU means water supply fixture units.
GPM means - gallons per minute.
FM means - predominately flushometer type water closets or syphon jet urinals.
FT means - predominately flush tank type water closets or washdown urinals.
NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

IIHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Note: WSFU means water supply fixture units.

GPM means - gallons per minute.

FM means - predominately flushometer type water closets or syphon jet urinals.

FT means - predominately flush tank type water closets or washdown urinals.

NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Table 82.40-8

MAXIMUM ALLOWABLE LOAD FOR POLYBUTYLENE TUBING - ASTM D3309 AND
CHLORINATED POLYVINYL CHLORIDE TUBING - ASTM D2846

Pressure Loss Due to Fric- tion (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																	
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	-	-	-	0.5	-	0.5	2.5	-	2.5	4.0	-	4.0	6.5	-	8.0	13.0	4.5	18.0
1	-	-	-	1.5	-	1.5	3.5	-	3.5	6.0	-	7.0	9.5	-	12.5	19.0	6.0	28.5
2	-	-	-	2.5	-	2.5	5.5	-	6.5	9.0	-	12.0	14.0	4.5	20.0	28.0	11.0	50.0
3	0.5	-	0.5	3.5	-	3.5	6.5	-	8.0	11.5	4.0	15.0	17.0	5.5	25.0	35.0	20.0	70.0
4	1.0	-	1.0	4.0	-	4.0	7.5	-	9.5	13.0	4.5	18.0	20.0	6.5	30.0	42.0	30.0	100
5	1.5	-	1.5	4.5	-	5.0	8.5	-	11.0	15.0	5.0	22.0	23.0	7.5	37.0	47.0	42.0	117
6	2.0	-	2.0	5.0	-	6.0	9.5	-	12.5	16.5	5.5	24.0	25.0	8.5	43.0	52.0	53.0	136
7	2.0	-	2.0	5.5	-	6.5	10.5	-	14.0	18.0	6.0	27.0	27.0	10.0	48.0	58.0	70.0	165
8	2.0	-	2.0	6.0	-	7.0	11.5	4.0	16.0	19.0	6.0	28.5	30.0	14.0	55.0	NP		
9	2.5	-	2.5	6.0	-	7.0	12.0	4.0	17.0	20.5	6.5	31.0	32.0	16.0	60.0			
10	2.5	-	2.5	6.5	-	8.0	12.5	4.5	17.5	22.0	5.0	35.0	34.0	19.0	67.0			
11	2.5	-	2.5	7.0	-	9.0	13.5	4.5	19.0	23.0	6.0	38.0	NP					
12	3.0	-	3.0	7.0	-	9.0	14.0	4.5	20.0	24.0	7.0	40.0						
13	3.0	-	3.0	7.5	-	9.5	14.5	4.5	21.0	NP								
14	3.0	-	3.0	8.0	-	10.0	15.5	5.0	22.0									
15	3.0	-	3.0	8.0	-	10.0	16.0	5.0	23.0									
16	3.5	-	3.5	8.5	-	11.0	16.5	5.5	24.0									
17	3.5	-	3.5	8.5	-	11.0	NP											
18	3.5	-	3.5	9.0	-	12.0												
19	3.5	-	3.5	9.0	-	12.0												
20	4.0	-	4.0	9.5	-	12.5												
21	4.0	-	4.0	10.0	4.0	13.0												
22	4.0	-	4.0	NP														
23	4.0	-	4.0															
24	4.0	-	4.0															
25	4.0	-	4.0															
26	4.0	-	4.0															
27	4.5	-	5.0															
28	4.5	-	5.0															
29	4.5	-	5.0															
30	5.0	-	6.0															
31	5.0	-	6.0															
	NP																	

Note: WSFU means water supply fixture units.

GM means gallons per minute.

FM means predominately flushometer type water closets or syphon jet urinals.

FT means predominately flush tank type water closets or washdown urinals.

NP means - not permitted, velocities exceed 8 feet p

For using this table, round the calculated pressure friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes f distribution piping.

Note: WSFU means water supply fixture units.

GPM means gallons per minute.

FM means predominately flushometer type water closets
or syphon jet urinals.

FT means predominately flush tank type water closets
or washdown urinals.

NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to
friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water
distribution piping.

History: 1-2-56; r. and recr. Register, November, 1972, No. 203, eff. 12-1-72; r. and recr.
Register, February, 1979, No. 278, eff. 3-1-79; renun. from H 62.13, Register, July, 1983, No.
331, eff. 8-1-83; renun. from ILHR 82.13 and r. and recr. (2) (b) and (4) (d) 1., am. (4) (c) 3.
and (6) (a) (intro.), cr. (6) (b), Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Reg-
ister, May, 1988, No. 389, eff. 6-1-88.

ILHR 82.41 Back-siphonage, cross-connections and potability control. (1)
PROTECTION OF POTABLE WATER SUPPLY. (a) *General.* Potable water supply systems shall be designed, installed and maintained in such manner as to prevent contamination from non-potable liquids, solids or gases from being introduced into the potable water supply through cross-connections or any other piping connections to the system.

(b) *Interconnections.* Interconnections of water services between 2 or more public water systems, water distribution systems, or a private and public supply shall be permitted only with approval of the department.

(c) *Cross-connection control.* Cross-connections are prohibited except as approved by the department when suitable protective devices such as the reduced pressure zone backflow preventer or equal are installed, tested and maintained to insure proper operation on a continuing basis.

(d) *Water treatment.* All water treatment compounds approved by the department for introduction into the potable water distribution system shall be by a positive displacement pump.

(e) *Painting of water tanks.* The interior surface of the potable water tank shall not be lined, coated, painted or repaired with any material which will affect either the taste, odor, color or potability of the water supply when the tank is placed in or returned to service.

(f) *Used piping.* Piping which has been used for any other purpose than conveying potable water shall not be used for conveying potable water.

(g) *Water supply to boilers.* Potable water supply to boilers or boiler feed water systems shall be through an air-gap or approved backflow preventer.

(h) *Prohibited connections to fixtures and equipment.* Connection to the potable water supply system for the following shall be protected against backflow or back-siphonage.

1. Operating, dissection, embalming and mortuary tables or similar equipment. In such installations the hose used for water supply shall terminate at least 12 inches away from every point of the table or attachments. See following sketch.

Next page is numbered 143.

(13) RADIOACTIVE MATERIALS. See ch. HSS 157.

History: 1-2-56; am. (3) (4) and (5), Register, August, 1961, No. 68, eff. 9-1-61; r. and recr. Register, November, 1972, No. 203, eff. 12-1-72; r. and recr., Register, February, 1979, No. 278, eff. 3-1-79; renum. from H 62.16, Register, July, 1983, No. 331, eff. 8-1-83; renum. from ILHR 82.16 and am. (7) (b), (10) (a) 1. and 2., (b) 2., (f) (intro.) and (h), Register, February, 1985, No. 350, eff. 3-1-85.

ILHR 82.51 Mobile home sites and parks. (1) DRAIN SYSTEMS. (a) Private interceptor main sewer. The maximum number of mobile homes served by private interceptor main sewer shall be in accordance with Table 82.51.

Table 82.51
MAXIMUM NUMBER OF MOBILE HOMES SERVED BY A PRIVATE
INTERCEPTOR MAIN SEWER

Diameter of Private Interceptor Main Sewer (in inches)	Pitch (inch per foot)		
	1/16	1/8	1/4
4	None	2	2
5	2	2	2
6	26	34	49
8	Load Shall Not Exceed Capacity of Pipe ^a		

Note a: See s. ILHR 82.30 (4) (d).

(b) *Building sewer.* The building sewer for a mobile home shall be at least 4 inches in diameter.

(c) *Mobile home drain connector.* The piping between the mobile home drain outlet and the building sewer shall have a minimum slope of $\frac{1}{4}$ inch per foot, and shall be of materials approved for above ground drain and vent pipe in accordance with ch. ILHR 84. The connector shall be protected against freezing.

(d) *Other requirements.* Mobile home park sewer systems shall also conform to the applicable requirements of s. ILHR 82.30.

(2) **WATER SUPPLY SYSTEMS. (a) Private water mains. 1.** Supply demand. The supply demand in gallons per minute in the private water main system shall be determined on the basis of the load in terms of water supply fixture units, and in terms of the relationship between load and supply demand. The demand load of a mobile home site shall be equivalent to at least 15 water supply fixture units.

2. Sizing. The private water mains shall be sized in accordance with s. ILHR 82.40. A private water main serving a mobile home park shall not be less than one inch in diameter.

3. Pressure. The minimum pressure within a private water main shall be sufficient to maintain a pressure of 20 psi at each mobile home site under normal operating conditions.

4. Valving. Each private water main shall be provided with a gate or full flow valve at its source and at each branch connection. The valves shall be installed in a manhole or valve box so as to be accessible for operation.

(b) *Water services. 1. Size.* Each mobile home site shall be served by a separate water service not less than $\frac{1}{4}$ inch in diameter.

2. Valving. a. Each water service shall be provided with a curb stop within each mobile home site but not under the parking hard stand or pad.

b. A valve, of at least $\frac{3}{4}$ inch diameter, shall be located on the upper end of the water service pipe. In lieu of the valve located on the upper end of the water service, a freezeless type hydrant of at least $\frac{3}{4}$ inch diameter may be used.

c. The installation of underground stop and waste valves shall be prohibited.

3. Mobile home water connector. The piping between the mobile home water inlet and the water service shall be of materials approved for water distribution pipe in accordance with s. ILHR 84.30 (3).

(c) *Protection against freezing.* All water main and water service piping shall be protected against freezing.

(d) *Separation of water and sewer piping.* Separation of water and sewer piping shall be in accordance with s. ILHR 82.40 (2) (d).

(e) *Other requirements.* Mobile home park water supply systems shall also conform to the applicable requirements of s. ILHR 82.40.

(3) BUILDING SEWER AND WATER SERVICE TERMINATIONS. (a) *Frost sleeves.* Each building sewer and water service shall have a frost sleeve extending at least 42 inches below grade. The sleeve shall be of a material approved for building sewers. Frost sleeves shall terminate at grade. A frost sleeve shall be covered or sealed when not in use.

(b) *Termination elevation.* Each water service shall terminate at least 6 inches above the surrounding finished grade. Each building sewer shall terminate at least 4 inches above the surrounding finished grade and shall not terminate higher than the water service pipe.

(c) *Piping not in use.* A building sewer or water service pipe not connected to a mobile home shall be capped or plugged.

Note: See Appendix for further explanatory material.

History: Cr, Register, February, 1985, No. 350, eff. 3-1-85.

Subchapter VI

Installation

ILHR 82.60 Pipe hangers and supports. The provisions of this section control the types, materials and installation of anchors, hangers and supports for plumbing piping.

(1) MATERIAL. (a) *Strength.* Hangers, anchors and supports for piping shall be of sufficient strength to support the piping and its contents. Drain piping shall be considered as being full of water. Underground piers for pipe support shall be of concrete, masonry, plastic or pressure treated wood.

(b) *Compatibility.* 1. Hangers and straps shall be of a compatible material that will reduce the potential for galvanic action with the piping.

Register, May, 1988, No. 389

2. Hangers and straps may not distort, cut or abrade piping.

(2) **INSTALLATION.** (a) Piping hangers and anchors shall be securely attached to the building's structure at intervals to support the piping and its contents, but not at intervals greater than those specified in Table 82.60. The connection of drain piping to a fixture or appliance shall be considered a point of support.

(b) Hubless pipe installed in the horizontal position shall be supported within 24 inches on each side of a joint, unless the joint has an alignment retaining shield.

(c) Hangers shall not be attached to a building's structure by means of wood plugs.

Table 82.60
Support Spacing

Pipe Material	Maximum Horizontal Spacing	Maximum Vertical Spacing
Cast iron	5'-0" or within 18" of each joint which is between lengths of pipe over 5'-0" long.	Each story height, but not to exceed 15'-0".
Steel and Brass	10'-0" for pipe ¾" or less in diameter. 12'-0" for pipe larger than ¾" in diameter.	Every other story height, but not to exceed 30'-0".
Copper	6'-0" for pipe 1¼" or less in diameter. 10'-0" for pipe larger than 1-¼" in diameter.	Each story height, but not to exceed 10'-0".
Lead	Continuous support	4'-0"
Plastic	4'-0" for drain and vent piping. 32" for water distribution piping.	Each story height, but not to exceed 10'-0" for drain and vent piping; 4'-0" for water distribution piping.
Borosilicate glass ^a	8'-0"	Each story height for pipe 3" or larger in diameter. Every other story height for pipe less than 3" in diameter.

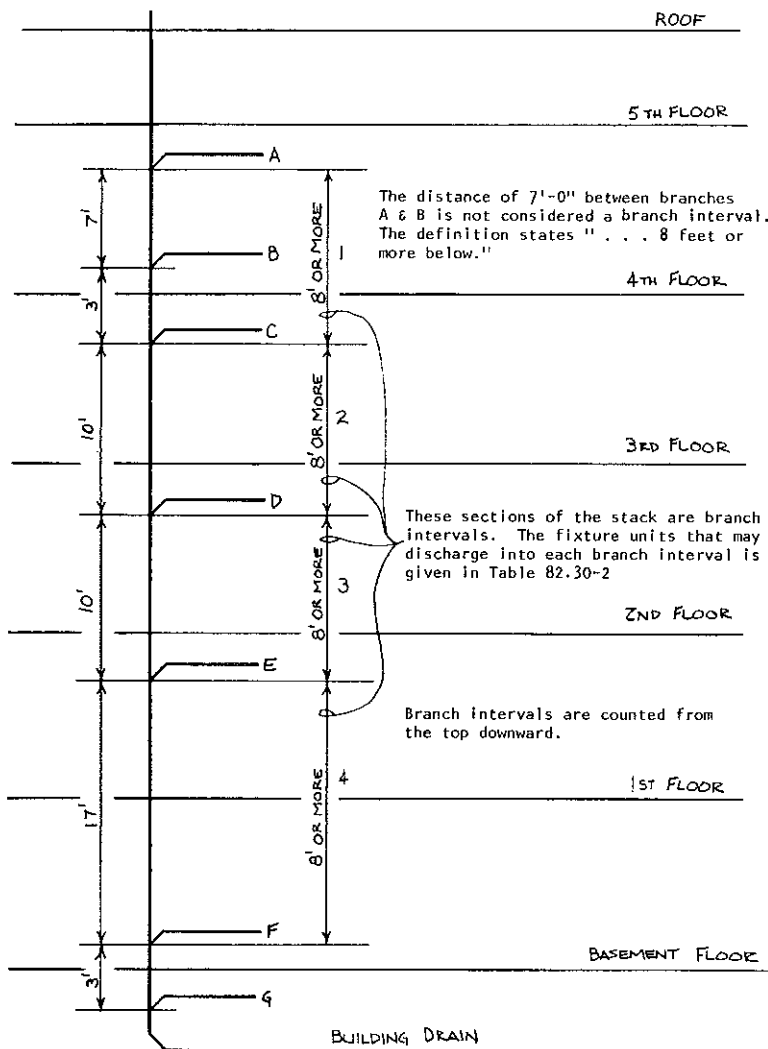
Note a: Padded hangers shall be used.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Register, May, 1988, No. 389, eff. 6-1-88.

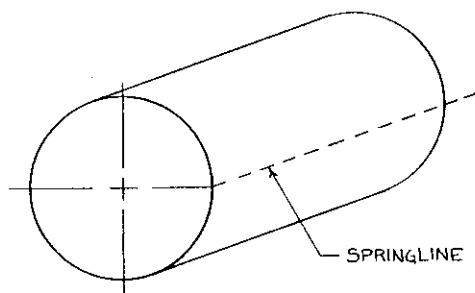
ILHR 82**APPENDIX**

The material contained in this 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-82.11 (29) Branch intervals.



A-82.11 (140) Springline of pipe.



On a round pipe the springline is along the horizontal centerline.

A-82.20 and A-82.21 FORMS. The following forms (DILHR SBX-8, SBD-6154, 6115, 6479, 6192 and 7278) are used by the department in administration of this administrative code. Copies of these forms are available from the Division of Safety and Buildings, Plumbing Bureau, P.O. Box 7969, Madison, Wisconsin 53707.



**GENERAL PLUMBING
PLAN APPROVAL APPLICATION**

STATE OF WISCONSIN DILHR
DIVISION OF SAFETY & BUILDINGS
BUREAU OF PLUMBING
201 E. Washington Avenue, Rm 141
P.O. Box 7865, Madison, WI 53707
608-266-3615

INSTRUCTIONS: This form is required with each general plumbing plan submittal. Please complete both sides. Examination fees, as determined on this form, shall accompany plan submittal. Data required in submittal is described on reverse side of this form.

1. PROJECT INFORMATION (type or print clearly)			Date Submitted:		
Name of Submitting Party (Plans returned to same)			Project Name		
Street & No.			Project Location - Street & No. or Legal Description		
City	State	Zip	City	County	
Telephone No. (include area code)			Designer (Plumbing)	Telephone No. (include area code)	
2. PLANS FOR:			Owners Name		
☐ New Building ☐ Addition ☐ Remodel ☐ Revision to plumbing plan No.			Telephone No. (include area code)		
2a. Fee For Revisions - \$20.00			Street & No. (current address)		
			City		
			State		
			Zip		

Office Use Only	3. THIS APPLICATION IS FOR: (Check Appropriate Box(es))	FEE COMPUTATIONS (See Reverse Side for Remodeling Fees)	4. FEE SUBMITTED	Office Use Only
29.	3a. ☐ Sanitary Building Sewer Only (no drain)	Sum of Sanitary Sewer Diameters..... Inches x \$10.00 =	4a.	
31.	3b. ☐ Sanitary Drain and Vent, with or w/o Sanitary Building Sewer	Sum of Sanitary Sewer Diameters..... Inches x \$20.00 =	5a.	
32.	3c. ☐ Sanitary Private Interceptor Main Sewer	Sum of Largest Diameters..... Inches x \$8.00 =	6a.	
33.	3d. ☐ Water Service Only (no water distribution system)	Sum of Water Service Diameters..... Inches x \$10.00 =	7a.	
34.	3e. ☐ Water Distribution System with or w/o Water Service	Sum of Water Service Diameters..... Inches x \$20.00 =	8a.	
35.	3f. ☐ Private Water Main	Number of Water Main Systems..... x \$35.00 =	9a.	
37.	3g. ☐ Building Storm Drainage with or w/o Storm Sewer	Sum of Storm Sewer Diameters..... Inches x \$4.00 =	10a.	
38.	3h. ☐ Storm Private Interceptor Main Sewer	Sum of Largest Diameters..... Inches x \$8.00 =	11a.	
39.	3i. ☐ Controlled Roof Drainage System	\$30.00 Required =	12a.	
40.	3j. ☐ Reduced Pressure Principle Backflow Preventer	Number of Valves..... x \$35.00 =	13a.	
41.	3k. ☐ Turf Sprinkler System	Number of Turf Sprinkler Systems..... x \$30.00 =	14a.	
42.	3l. ☐ Grease Interceptor *	Number of Grease Interceptors..... x \$40.00 =	15a.	
43.	3m. ☐ Chemical Waste System *	Fee determined as per fees for additions and remodeling	16a.	
44.	3n. ☐ Garage Catch Basin *	Number of Garage Catch Basins..... x \$40.00 =	17a.	
45.	3o. ☐ Oil Interceptor *	Number of Oil Interceptors..... x \$40.00 =	18a.	
46.	3p. ☐ Car Wash Interceptor *	Number of Car Wash Interceptors..... x \$40.00 =	19a.	
47.	3q. ☐ Sanitary Dump Station *	Number of Sanitary Dump Stations..... x \$40.00 =	20a.	
48.	3r. ☐ Mobile Home Parks	1-25 Sites \$155.00 26-50 Sites \$210.00	21a.	
49.	3s. ☐ Engineered Plumbing System	51-125 Sites \$210.00 Over 125 Sites \$335.00	22a.	
50.	3t. ☐ Petition for Variance (must be submitted on form SB-8)	\$100.00	23a.	
51.	3u. ☐ Priority Plan Review	Enter Same Amount as Subtotal	24a.	
		SUBTOTAL	25a.	
		TOTAL FEE	26a.	

* NOTE * No Additional Fee Required if Submitted With Sanitary Drain and Vent System

NOTE: Fees are pursuant to Wis. Adm. Code, Chapter Ind. 68, and may be subject to change annually Effective July 1, 1984

SBD-4154 (R. 07/86)

- CONTINUE ON REVERSE SIDE -

5. ENCLOSURES

- ☐ Enclosed
☐ Two sets of plans and
☐ Under separate cover, please find the following:
☐ Three sets of plans and
☐ One set of Specifications
 Check Number _____ In the amount of _____ Written by _____

MAKE ALL CHECKS PAYABLE TO: DILHR, SAFETY & BUILDINGS DIVISION.

6. REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER DATA.

Indicate Valve Size, Manufacturer, Model No. and Location in Building (Room No., etc.) for each valve.

1. _____ 3. _____
 2. _____ 4. _____

7. PLAN SUBMITTAL SHALL INCLUDE THE FOLLOWING IN ACCORD WITH CODE SECTION ILHR 82.20.

- A. One complete set of properly signed plans and specifications (indicating materials and fixtures) with one additional copy of plumbing drawings. Plans shall include:
- Plot plan showing sewer and water.
 - Floor plan showing horizontal drains, water distribution mains and all fixtures and equipment to be installed.
 - Riser diagrams of the drain, vent and water distribution systems, with pipe sizes and fixture unit loads shown.
 - Complete water calculations in accord with ILHR 82.40(4)(a).
 - Complete storm drain sizing calculations.
 - Remodeling or additions shall include existing loads.
 - Water Quality Management Letter if required by s. ILHR 82.20(4)(c).
 - Plans including common ownership plumbing systems must be accompanied by form SBD-7615.

8. EXAMINATION FEES FOR ADDITIONS AND REMODELING.

When new or relocated fixtures or both are connected to the existing piping inside a building the fee shall be determined in accordance with the following procedures:

A. 'Sanitary Building Sewer, Drain and Vent.'

- Total all of the drainage fixture units that are being added or relocated.
- Refer to Table 82.30-2, Chapter ILHR 82, and determine the horizontal drain size that would be required if all new or relocated fixtures discharged through one pipe.
- Determine fee based on Table 69.23-1 Type 1, Chapter Ind. 69.

Ind. Table 69.23-2

GPM	FEE
6	\$10.00
12	\$15.00
21	\$20.00
31	\$25.00
46	\$30.00
77	\$40.00
119	\$50.00
170	\$60.00
238	\$80.00

B. 'Building Water Distribution System.'

- Total all of the water supply fixture units that are being added or relocated, using s. ILHR 82.40 Table 13, and convert to gallons per minute (GPM) in accordance with s. ILHR 82.40 Table 14.
- The fees shall be determined in accordance with the GPM demand of the new or relocated fixtures as specified in Ind. Table 69.23-2.

C. 'Building Storm Sewer and Drainage System.'

- Total each different type of area that the new or relocated drains serve and convert to GPM using Tables 82.36-1, 2, and 3, Chapter ILHR 82. To this add the GPM discharge from any added or relocated clear water drains located inside the building.
- Refer to Table 82.36-4, Chapter ILHR 82, using the column for $\frac{1}{4}$ " ft. pitch, determine the horizontal drain size that would be required if all new or relocated fixtures discharged through one pipe. Use this pipe size for determining the fee.
- Determine the fee based on Table 69.23-1 Type 5, Chapter Ind. 69.

INDUSTRY, LABOR AND HUMAN RELATIONS

ILHR 82

167

PETITION FOR VARIANCE
OF A RULE IN THE
WISCONSIN ADMINISTRATIVE CODE

WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P.O. BOX 7989, 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
City	State & Zip	State & Zip
City	County	Phone
Phone	Plan Number(s) IF KNOWN	Name of Contact Person

1. Rule _____ of the Wisconsin Administrative 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 ILHR 80.15 or Contact The Department at (608)-267-7843

NOTE: Petitioner must be building owner. Tenants, agents, designers, contractors, attorneys, etc. may not sign petition unless a Power of Attorney is submitted with the Petition.

_____, being duly sworn, I state as petitioner; that I have read the foregoing petition, that I believe it to be true and I have significant ownership rights in the subject building.

Signature of Owner

Subscribed and sworn to me this date: _____

_____, County, Wisconsin.

Notary Public

My commission expires: _____

SB-4 (R. 12/84)

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

FILL OUT THIS FORM COMPLETELY AND RETURN TO:
 DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
 DIVISION OF SAFETY AND BUILDINGS, BUREAU OF PLUMBING
 P.O. BOX 7969, MADISON, WI 53707

REDUCED PRESSURE BACKFLOW PREVENTER ANNUAL TEST REPORT

MANUFACTURER _____ MODEL _____ SIZE _____ SERIAL NUMBER _____

NAME OF PROJECT _____ COUNTY _____

ADDRESS (street, city, zip) _____

LOCATION OF DEVICE IN BUILDING _____

	CHECK VALVE #1	CHECK VALVE #2	DIFFERENTIAL PRESSURE RELIEF VALVE	COMMENTS
ANNUAL TEST	1. LEAKED ☐ 2. CLOSED TIGHT ☐	1. LEAKED ☐ 2. CLOSED TIGHT ☐	OPENED AT _____ LBS. REDUCED PRESSURE. DID NOT OPEN ☐	
REPAIRS	DAMAGED: DISC ☐ SPRING ☐ GUIDE ☐ PIN RETAINER ☐ HINGE PIN ☐ SEAT ☐ DIAPHRAGM ☐ OTHER, DESCRIBE ☐	CLEANED REPLACED: DISC ☐ SPRING ☐ GUIDE ☐ PIN RETAINER ☐ HINGE PIN ☐ SEAT ☐ DIAPHRAGM ☐ OTHER, DESCRIBE ☐	CLEANED REPLACED: DISC: ☐ UPPER ☐ LOWER ☐ SPRING ☐ DIAPHRAGM: LARGE: ☐ UPPER ☐ LOWER ☐ SMALL ☐ SEAT: ☐ UPPER ☐ LOWER ☐ SPACER: ☐ LOWER ☐ OTHER, DESCRIBE ☐	
FINAL TEST	CLOSED TIGHT ☐	CLOSED TIGHT ☐	OPENED AT _____ LBS. REDUCED PRESSURE	

THE ABOVE REPORT IS CERTIFIED TO BE TRUE. CERTIFICATION # _____

INITIAL TEST BY _____ REPRESENTING (CO.) _____ DATE

MO.	DAY	YR.

REPAIRED BY _____ DATE _____

FINAL TEST BY _____ REPRESENTING (CO.) _____ DATE

MO.	DAY	YR.

SBD-6115 (R.06/82)

WATER CALCULATION WORKSHEET

Information Needed for Water Service Sizing

- 1) _____ Demand of building in G.P.M.
- 2) _____ Low pressure at main in street (or at external pressure tank).
- 3) _____ Difference in elevation. Main to meter (or external pressure tank to building control valve).
- 4) _____ Size of water meter (if applicable).
- 5) _____ Developed length from main to meter (or external pressure tank to building control valve).

Your First Goal is to Find the Available Pressure After the Water Meter (or at building control valve). To obtain this, you must

- 1) _____ Find pressure loss due to friction in _____ inch water service.
- 2) _____ Find pressure loss due to elevation, main to meter (or external pressure tank to building control valve) multiply difference in elevation by .434 psi/ft.
- 3) _____ Find pressure loss due to water heater. (from manufacturer or AWWA).
- 4) _____ Subtract the loss due to friction (Step 1), loss due to elevation (Step 2), and loss due to meter (Step 3) from the low street pressure (or low pressure at external pressure tank). This gives you available pressure after the water meter (or at the building control valve).

Information Needed for Water Distribution Sizing

Using the following formula, find permissible uniform pressure loss for friction (p.s.i./100' of pipe)

WHERE:
$$A = \frac{B - (C + D + E)}{F} \times 100$$

- A. _____ Permissible uniform pressure loss for friction. (p.s.i./100' of pipe).
- B. _____ Available pressure after water meter (at the building control valve or low pressure at internal pressure tank).
- C. _____ Pressure needed at controlling fixture.
- D. _____ Difference in elevation between water meter (building control valve or internal pressure tank) and controlling fixture in feet _____ x .434 psi/ft.
- E. _____ Pressure loss due to water heater, water treatment devices and backflow preventers.
- F. _____ Developed length from water meter (building control valve or internal pressure tank) to controlling fixture in feet _____ x 1.5.

With permissible uniform pressure loss, go to applicable table for distribution sizing.

SBD-6479 (R.05/86)



Bureau of Plumbing
201 East Washington Avenue
P. O. Box 7969
Madison, WI 53707
(608) 266-0521

ATTENTION

NOTICE OF INSTALLATION

The enclosed plans for the reduced pressure principle backflow preventer(s) (RP's) have been approved by the department. This form is required to be filled out and returned to the department in accordance with A or B. FAILURE TO DO SO CANCELS THE APPROVAL FOR INSTALLATION.

- A. For a new installation this form must be completed by the master plumber in charge of the installation.
- B. For an existing installation this form must be completed by the person responsible for the design of the approved plumbing plans.

DATE OF APPROVAL: _____ PLAN IDENTIFICATION NO: _____

NAME AND ADDRESS OF PROJECT: _____

RP valves are required by the Department to be tested at the time of installation and at least once a year thereafter. (Refer to plan approval letter, attachment 1, item 6)

VALVE INFORMATION

DATE OF INSTALLATION: _____

SIZE	MFR	MODEL	SERIAL #	LOCATION IN BUILDING	INSTALLED PER APPROVED PLAN
_____	_____	_____	_____	_____	☐ YES ☐ NO
_____	_____	_____	_____	_____	☐ YES ☐ NO
_____	_____	_____	_____	_____	☐ YES ☐ NO
_____	_____	_____	_____	_____	☐ YES ☐ NO
_____	_____	_____	_____	_____	☐ YES ☐ NO

NAME _____ (circle one) REG DESIGNER
OR M.P. NO: _____

ADDRESS _____
(type or print) (city) (state) (zip)

SIGNATURE _____ DAYTIME PHONE # _____

SBD-7278 (R.10/87)

ILHR 82

A-82.20 (2) **AGENT MUNICIPALITIES.** The department has designated to the following municipalities, the authority to review and approve plumbing plans and specifications for those plumbing installations to be located within the municipality's boundary limits and which require approval under s. ILHR 82.20 (1) (b).

Appleton
Beloit
Eau Claire
Green Bay
Greenfield

Kenosha
Madison
Manitowoc
Mequon
Milwaukee

Oconomowoc
Oshkosh
Racine
Two Rivers

A-82.20 (4) The following is a list of Designated Management Agencies and the counties they serve.

DESIGNATED MANAGEMENT AGENCY:

Harlan P. Kiesow, Clearing House Review
Coordinator
East Central Wisconsin Regional Planning
Commission
132 Main Street
Menasha, WI 54952
(414) 729-4770

William N. Lane
Director, Environmental Resources Planning
Dane County Regional Planning Commission
Room 523, City County Building
Madison, WI 53709
(608) 266-4417

Wm Patzke and B.F. Paruleski
Brown County Planning Commission
Room 608, City Hall
100 North Jefferson Street
Green Bay, WI 54301
(414) 436-3633

Kurt W. Bauer, Executive Director
Southeastern Wisconsin Regional Planning
Commission
916 North East Avenue
P.O. Box 1607
Waukesha, WI 53187-1607
(414) 547-6721

COUNTIES SERVED

Menominee, Shawano,
Waupaca, Outagamie,
Waushara, Marquette
Green Lake, Winnebago,
Calumet, Fond du Lac

Dane

Brown

Washington, Ozaukee
Waukesha, Milwaukee
Walworth, Racine, Kenosha

The following is a list of Sewer Service Area Plans approved by the Department of Natural Resources. For each Sewer Service Area Plan the approved Planning Agency and affected communities are shown.

CONTACTS - SEWER SERVICE AREA PLANSEau Claire - Chippewa Falls

Jerry Chasteen, Director
West Central Wisconsin Regional Planning
Commission
124½ Graham Avenue
Eau Claire, WI 54701
(715) 836-2918

AFFECTED COMMUNITIES

City of Eau Claire
City of Altoona
City of Chippewa Falls
Town of Hallie
Town of Seymour
Town of Union
Town of Washington

Hudson

Richard Thompson, County Planner
St. Croix County Planning Office
Courthouse
Hudson, WI 54016
(715) 386-5581

City of Hudson
Town of Hudson
Town of St. Joseph
Village of North Hudson
Town of Troy

Janesville

Phil Blazkowski, Director
Rock County Planning Development Agency
51 South Main Street, Courthouse
Janesville, WI 53545
(608) 755-2087

City of Janesville
Town of Harmony
Town of Janesville
Town of La Prairie
Town of Rock

LaCrosse

Arthur Bernhard
Department of Natural Resources
West Central District Office
1300 Clairmont Avenue
Eau Claire, WI 54701
(715) 839-3722

City of LaCrosse
City and Town of Onalaska
Town of Shelby
Town of Medary
Town of Campbell

Stevens Point

Chuck Kell, Director
Portage County Planning Department
County - City Building
1516 Church Street
Stevens Point, WI 54481
(715) 346-1334

City of Stevens Point
Village of Whiting
Village of Plover
Village of Park Ridge
Town of Hull
Town of Plover
Town of Linwood

Wausau

Joseph Pribanich
Marathon County Planning Commission
Courthouse
Forest Street
Wausau, WI 54401
(715) 847-5227

City of Wausau
Village of Rothschild
City of Schofield
Town of Weston
Town of Stettin
Town of Rib Mountain
Town of Kronenwetter

Wisconsin Rapids

Gary Popelka
Office of County Planning
Wood County Courthouse
400 Market Street
Wisconsin Rapids, WI 54495
(715) 421-8466

City of Wisconsin Rapids
Village of Biron
Town of Grand Rapids
Town of Rudolph
Town of Sigel
Town of Seneca
Town of Grant

A-82.20 (8) FEES. The following reprint of s. Ind 69.23 (1) may be used to determine the amount of fee required for general plumbing plan review by the department.

Ind 69.23 Plumbing and private sewage systems. (1) PLUMBING PLAN EXAMINATION FEES. (a) *Applicability.* Plan examination fees for preliminary or complete plans shall accompany the plans and specifications when submitted. If the department determines upon review of the plans that inadequate fees were provided, the necessary additional fee shall be provided prior to departmental approval.

(b) *Examination fees.* The plan examination fee shall be determined in accordance with Table 69.23-1.

Table 69.23-1

Type of Review	Fee
1. Sanitary drain and vent system.....	\$ 20.00 per inch diameter of each bldg. sewer
2. Sanitary building sewer only, no drain and vent.....	\$ 10.00 per inch diameter of each bldg. sewer
3. Building water distribution system	\$ 20.00 per inch diameter of each water service

ILHR 82

4. Building water service only, no water.....	\$ 10.00 per distribution system	inch diameter of each water service
5. Building storm and clear water drain system	\$ 4.00 per inch diameter of each bldg. storm sewer	
6. Sanitary private interceptor main sewers,	\$ 8.00 per determined on the largest diameter of each interceptor main sewer	inch diameter
7. Private water main	\$ 35.00	
8. Controlled roof drainage system, does not.....	\$ 30.00	
9. Reduced pressure zone principle type.....	\$ 35.00	
10. Turf sprinkler system.....	\$ 30.00	
11. Mobile home parks:		
1-25 sites.....	\$155.00	
26-50 sites.....	\$210.00	
51-125 sites.....	\$270.00	
Over 125 sites.....	\$335.00	
12. Manufactured homes, each model	\$250.00	

(c) *Examination fees for additions and remodeling.* When new or relocated fixtures or both are connected to the existing piping inside a building the fee shall be determined in accordance with the following procedures:

1. Sanitary building sewer, drain, waste and vent. a. Total all of the drainage fixture units that are being added or relocated.

b. Refer to s. ILHR 82.30 Table 82.30-2, and determine the horizontal drain size that would be required if all new or relocated fixtures discharged through one pipe.

Note: Disregard Note c limitation regarding water closets. This pipe size is used for determining the fee only and does not necessarily mean this pipe size is used in actual design or installation.

c. Determine fee based on Table 69.23-1 1.

2. Building water distribution system. a. Total all of the water supply fixture units that are being added or relocated, using s. ILHR 82.40 Table 13, and convert to gallons per minute (GPM) in accordance with s. ILHR 82.40 Table 14.

b. The fees shall be determined in accordance with GPM demand of the new or relocated fixtures as specified in Table 69.23-2.

Table 69.23-2

GPM	FEE
6.....	\$10.00
12.....	\$15.00
21.....	\$20.00
31.....	\$25.00
46.....	\$30.00
77.....	\$40.00
119.....	\$50.00
170.....	\$60.00
298.....	\$80.00

3. Building storm sewer and drainage system. a. Total all of the roof area that the new or relocated roof drains serve. For added or relocated clear water drains inside the building receiving continuous or semi-continuous discharge into the building storm drain, each gallon per minute (GPM) of discharge shall be computed as 26 square feet of roof area.

b. Refer to s. ILHR 82.36 Table 82.36-1, the column for $\frac{1}{4}$ " pitch, and determine the horizontal drain size that would be required if all new or relocated fixtures discharged through one pipe. Use this pipe size for determining the fee.

c. Determine the fee based on Table 69.23-1 5.

(d) *Priority plan review.* An appointment may be made with the department to facilitate the examination of plans in less than the normal processing time. The plans shall comply with the provisions of s. ILHR 82.20. Delivery of the plans for priority plan review shall be made in person. The fee for this type of plan examination shall be determined at twice the normal rate.

(e) *Reproduction fee.* If the correct number of plans or specifications have not been submitted, a minimum reproduction fee of \$7.00 per set shall be charged except that reproductions exceeding \$7.00 per set shall be charged actual costs. Reproduction fees shall be charged to the party submitting the plans.

(f) *Plan approval - additional copies.* Approval for sets of plans in excess of 3 sets shall be provided upon receipt of a fee of \$10.00 plus \$3.50 per plan sheet.

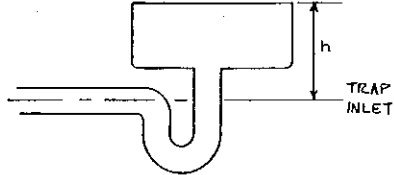
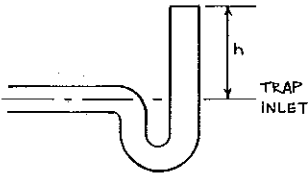
(g) *Revisions.* The fee for revisions to previously examined plans shall be \$20.00 per plan. This fee applies when plans are revised for reasons other than those that were requested by the department.

(h) *Projects without approval.* The fees specified in pars. (b) to (g) shall be doubled for those projects for which the installation of plumbing has started without department approval.

A-82.30 (4) The following tables lists the maximum GPM which can be expected to readily flow through a given size trap where the receptor has a height as indicated.

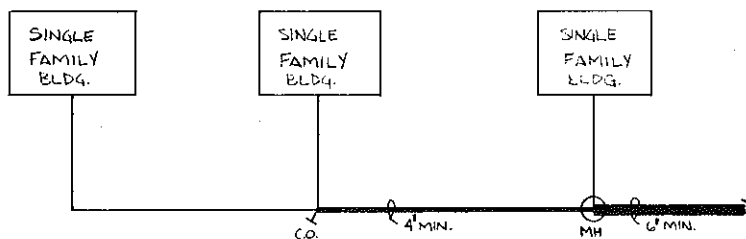
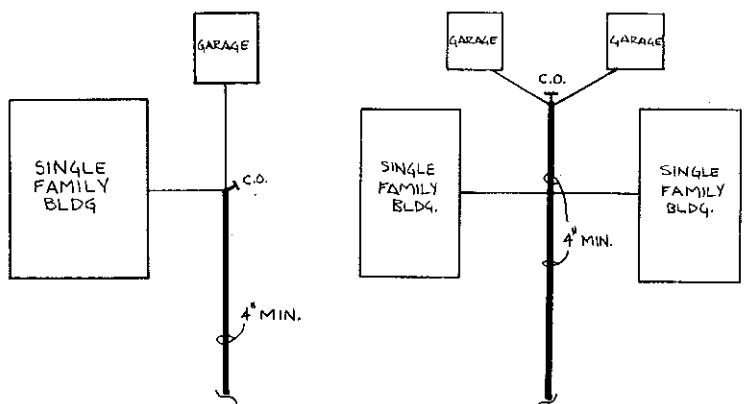
Also listed is a maximum drainage fixture unit load which a given size receptor trap may be expected to adequately receive.

Note: The department recommends an individual 4-inch diameter minimum trap and drain pipe for a commercial type dishwasher.

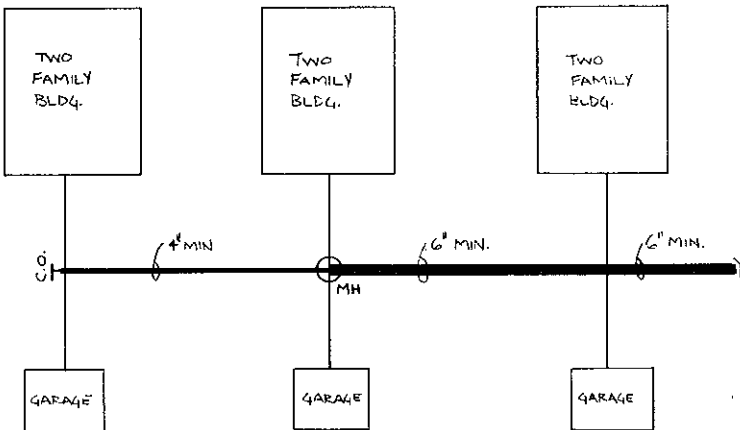
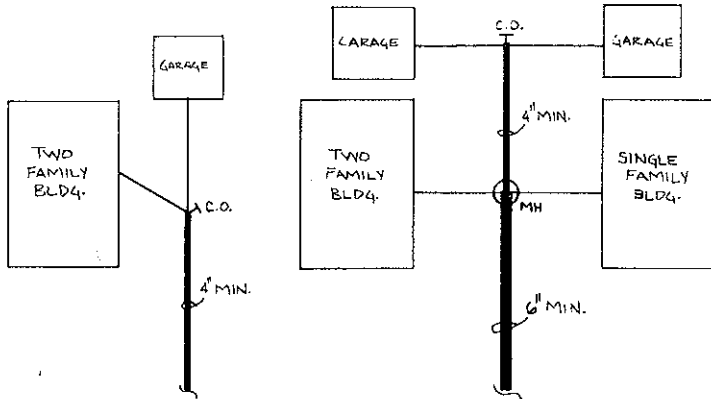


Receptor Trap size	H Height	GPM	d. f. u.
1-1/2"	12"	4	2
2"	14"	8	4
3"	15"	12	6
4"	17"	40	20
5"	20"	70	35
6"	22"	120	60
8"	25"	250	125

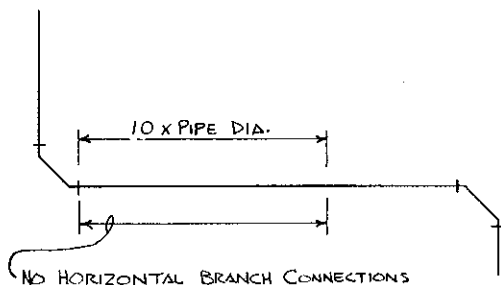
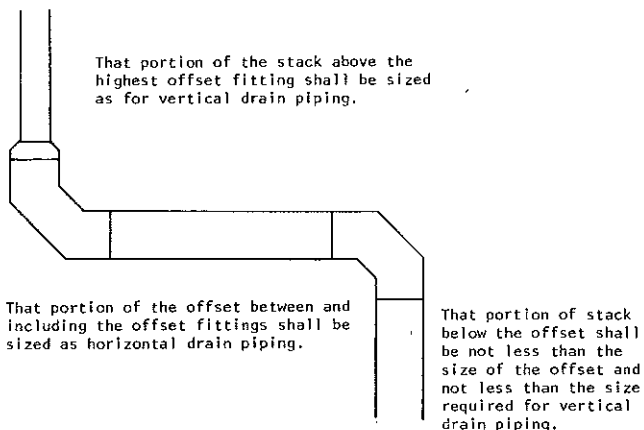
A-82.30 (4) (d) Minimum size of private interceptor main sewers.



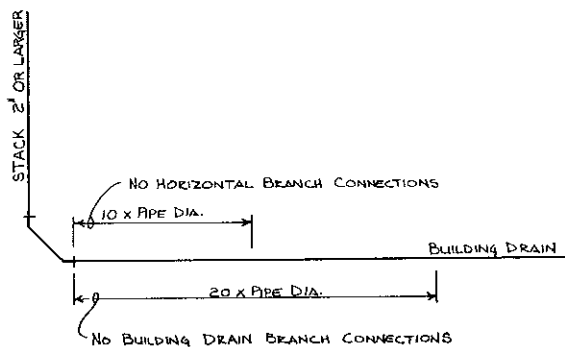
A-82.30 (4) (d) Minimum size of private interceptor main sewers.



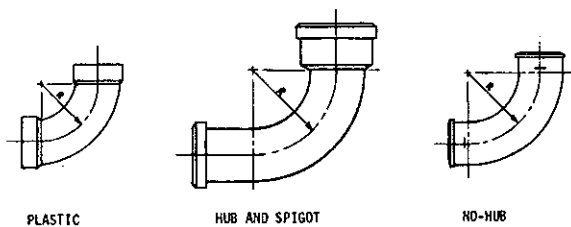
A-82.30 (6) (b) Offsets in vertical drains.



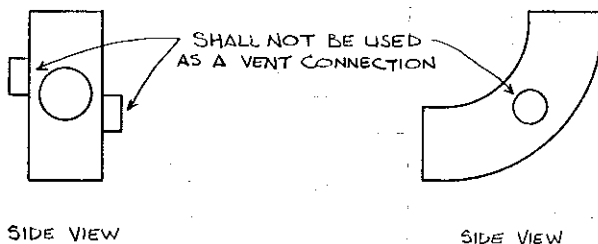
A-82.30 (7) Horizontal branch drain connection at base of a stack,



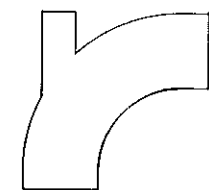
A-82.30 (8) Measuring radius of a fitting.



A-82.30 (9) Drain fittings and connections.



SIDE INLETS



ALLOWED
(SIDE VIEW)

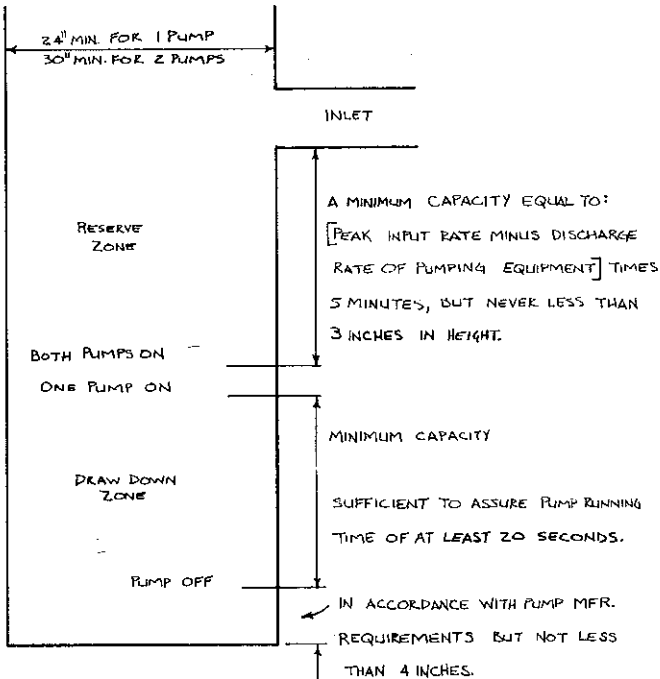


NOT ALLOWED
(TOP VIEW OR SIDE VIEW)

HEEL INLETS

A-82.30 (10) (a) Determining required capacity of sanitary sump.

SANITARY SUMP

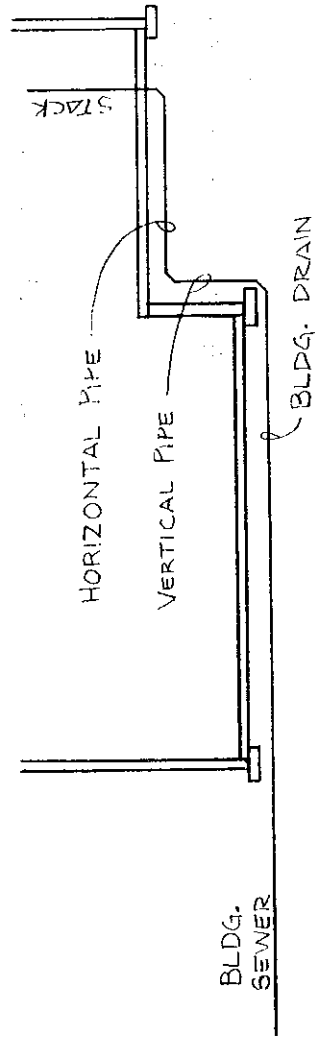
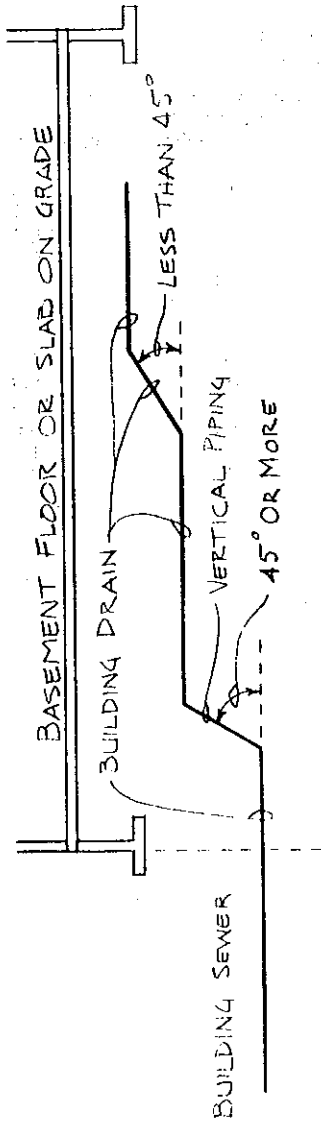


A-82.30 (10 (a))

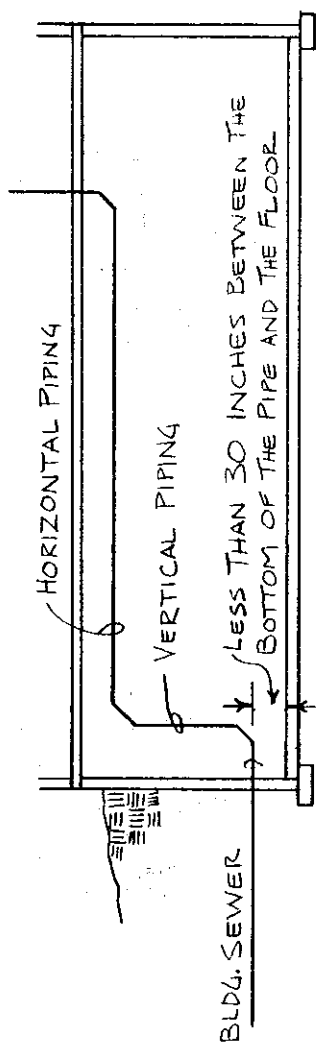
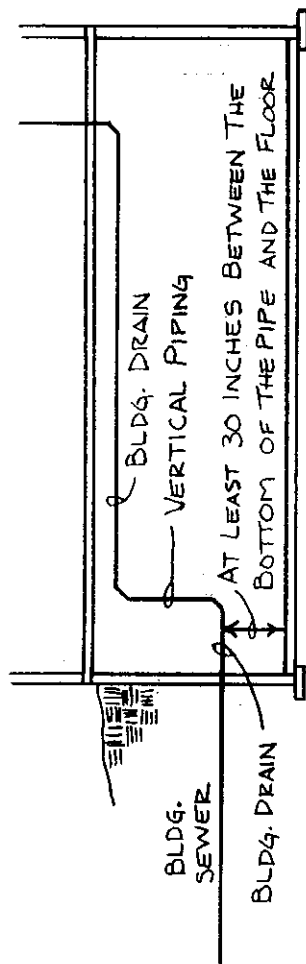
Capacity of Sumps
(in gallons)

Diameter of sump in inches	Volume in gal/ft	Diameter of sump in inches	Volume in gal/ft
24	23.5	41	68.6
25	25.5	42	72.1
26	27.6	43	75.5
27	29.7	44	79.1
28	32.0	45	82.7
29	34.3	46	86.5
30	36.8	47	90.2
31	39.2	48	94.0
32	41.8	54	119.0
33	44.5	60	147.0
34	47.2	66	178.0
35	50.0	72	211.5
36	52.8	78	248.4
37	55.9	84	288.1
38	59.0	90	330.8
39	62.1	96	376.3
40	65.3	108	477.3

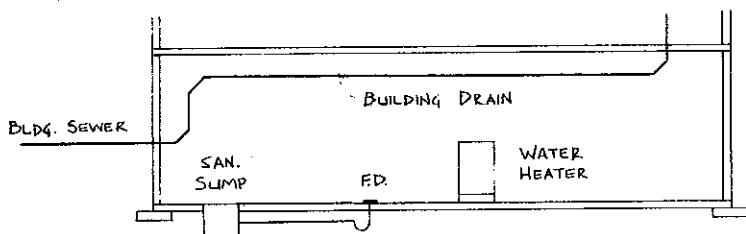
A-82.30 (11) (a) Building drains serving any building.



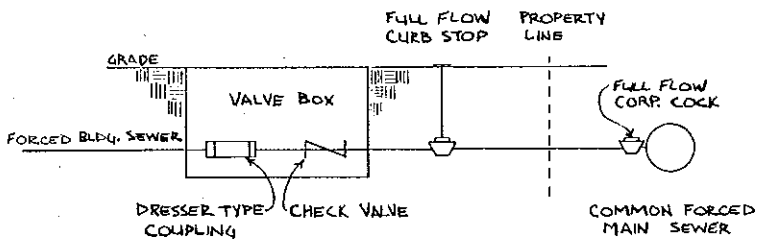
A-82.30 (11) (a) Building drains serving dwelling units.



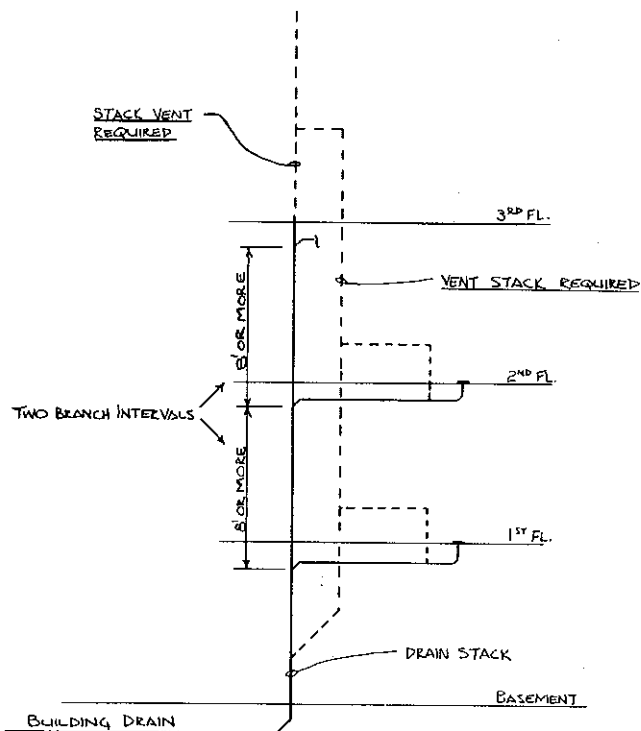
A-82.30 (11) (a) Floor drain required.



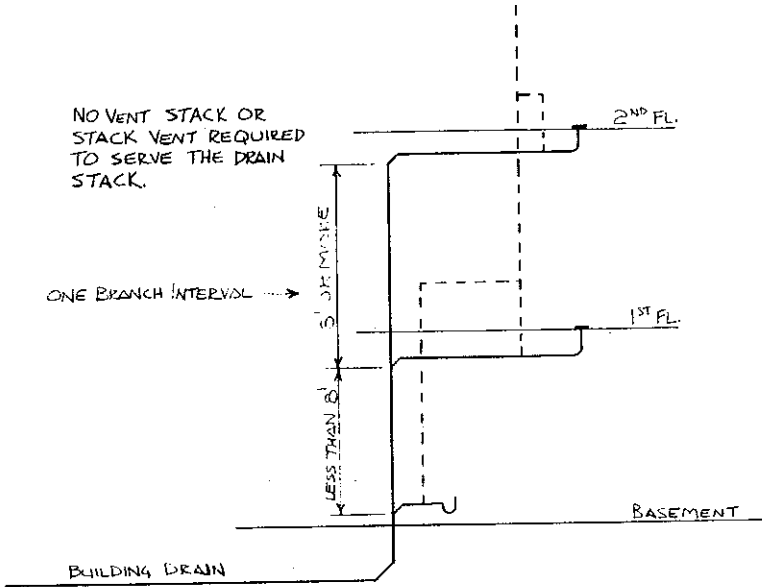
A-82.30 (11) (e) Connection to pressurized public sewer.



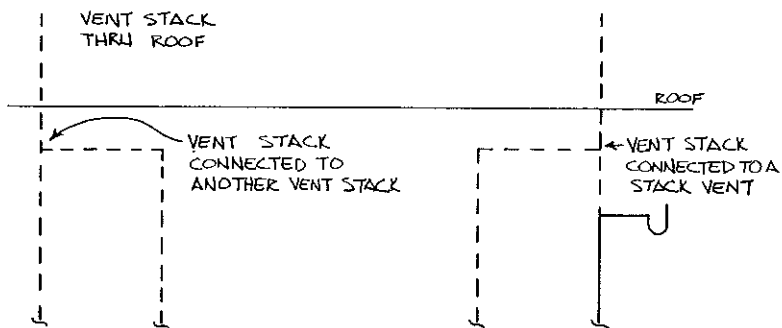
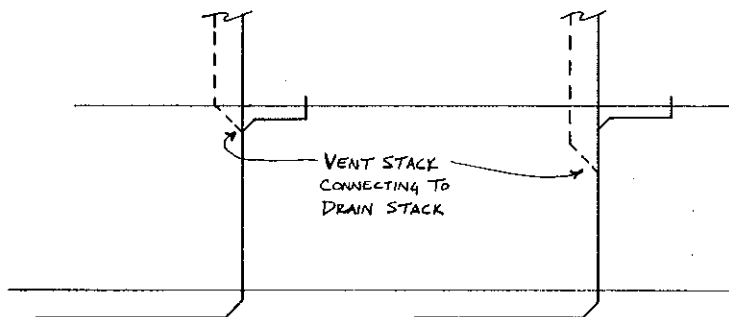
A-82.31 (4) (a) Where a vent stack and stack vent are required.



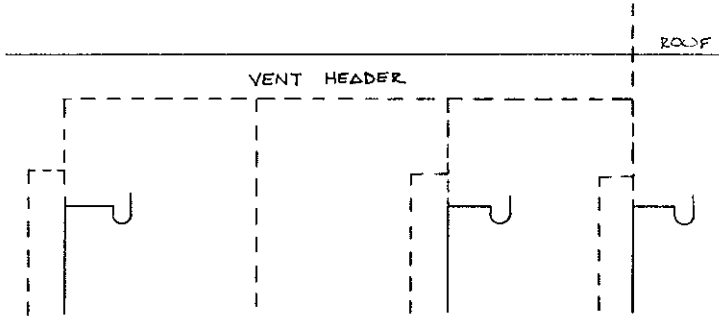
A-82.31 (4) (a) Where a vent stack and stack vent are not required.



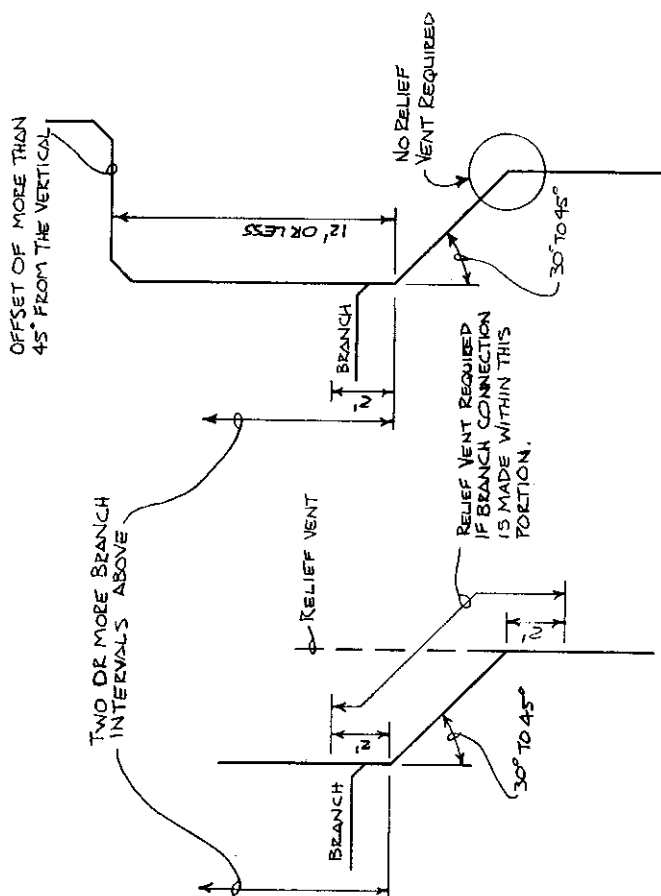
A-82.31 (4) (b) Installation of vent stack and stack vent.



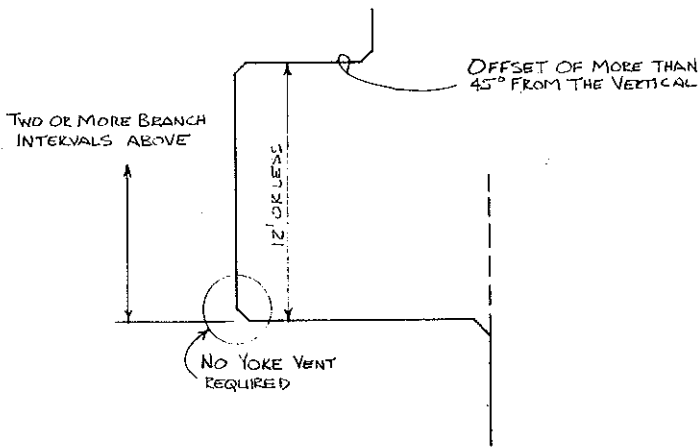
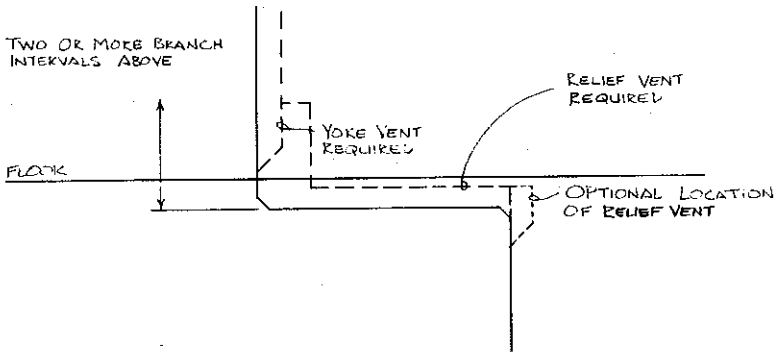
A-82.31 (4) (b) Installation of vent stack and stack vent.



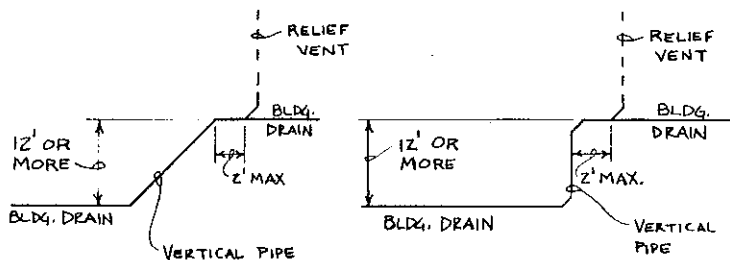
A-82.31 (5) (a) Relief vent for offsets of 30 to 45 degrees.



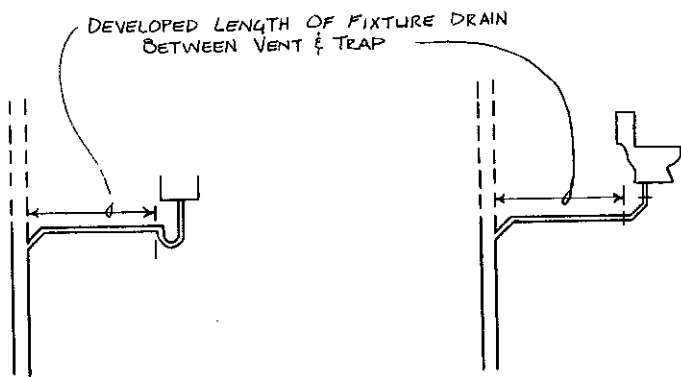
A-82.31 (5) (b) Relief and yoke vents For offsets of more than 45 degrees.



A-82.31 (7) Relief vents for building drains.

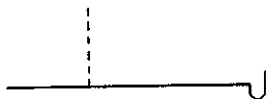


A-82.31 (9) Fixture vents.



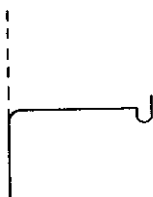
WHERE TRAP IS NOT AN INTEGRAL
PART OF THE FIXTURE

WHERE TRAP IS AN INTEGRAL
PART OF THE FIXTURE

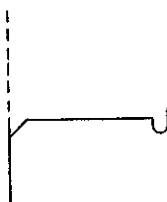


VENT CONNECTING TO HORIZONTAL DRAIN PIPING

VENT CONNECTING TO VERTICAL DRAIN PIPING

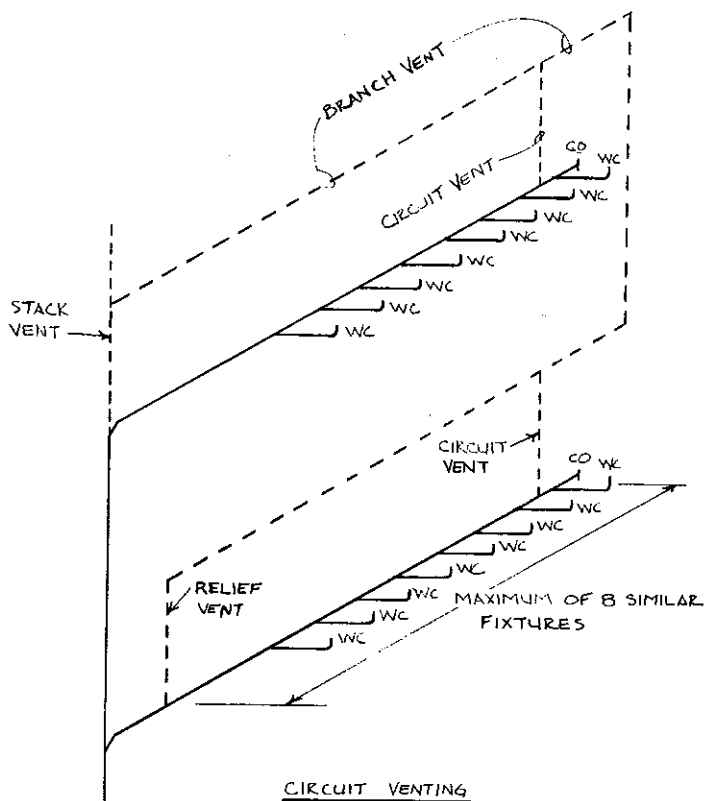


BY MEANS OF A
SANITARY TEE FITTING

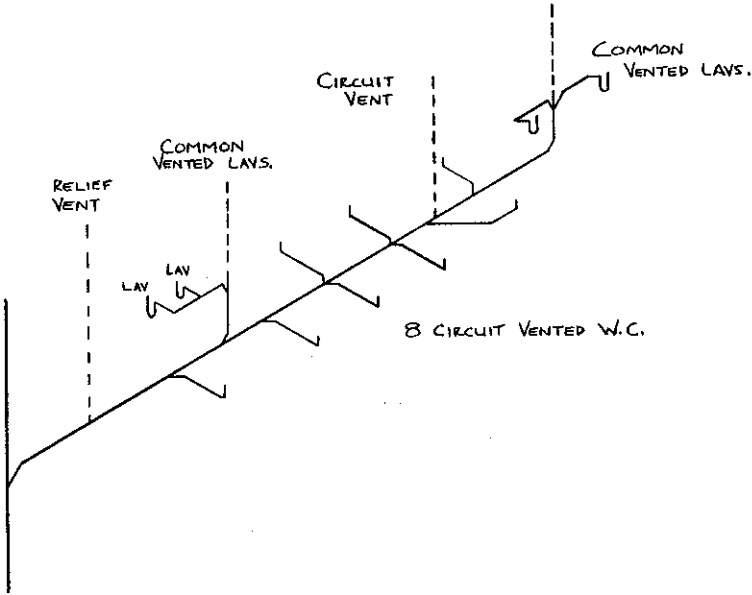


BY MEANS OF A
WYE PATTERN FITTING

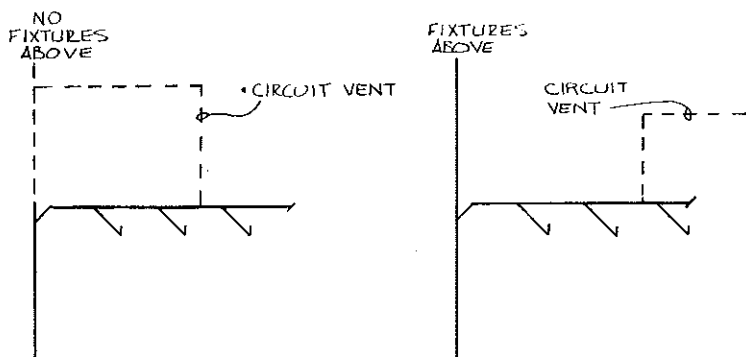
A-82.31 (10) Circuit venting.



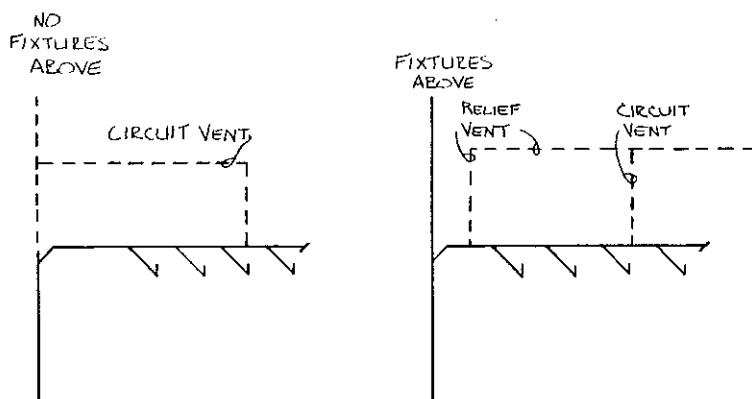
A-82.31 (10) Circuit venting.



A-82.31 (10) Circuit venting.

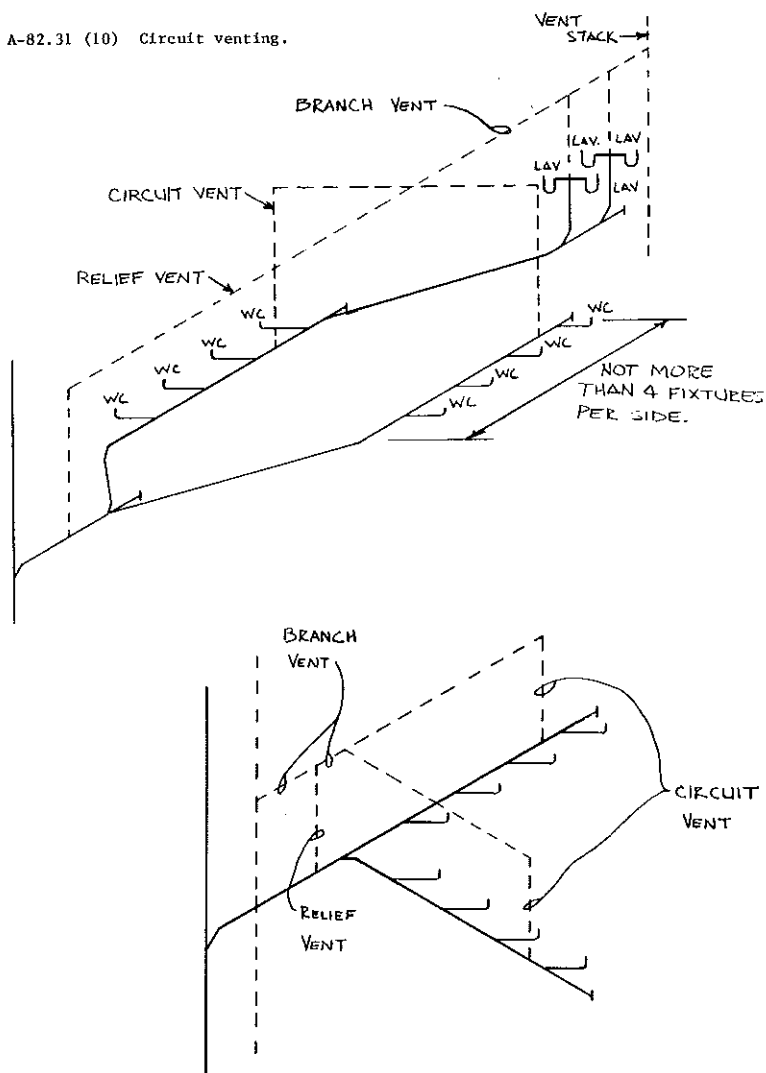


CIRCUIT VENTING
3 FIXTURES

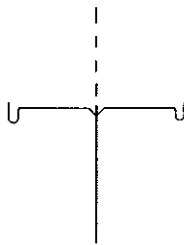


CIRCUIT VENTING 4 OR
MORE FIXTURES

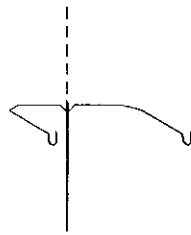
A-82.31 (10) Circuit venting.



A-82.31 (11) (a) Common vents, vertical drains.



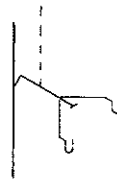
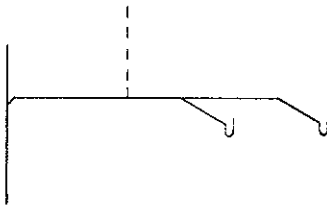
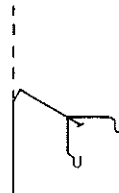
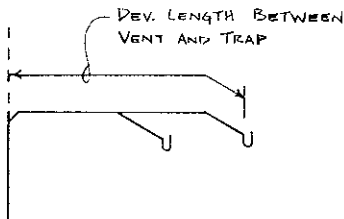
BACK-TO-BACK



SIDE-BY-SIDE

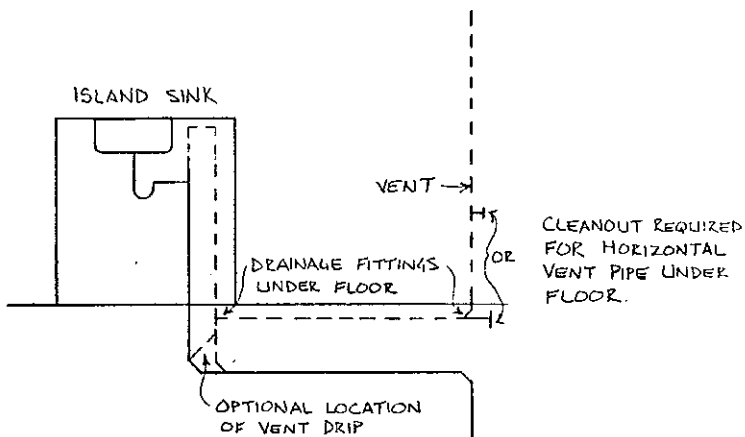
COMMON VENT SERVING ANY TWO FIXTURES

A-82.31 (11) (b) Common vents, horizontal drains.

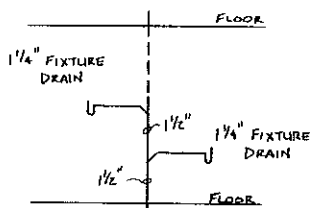
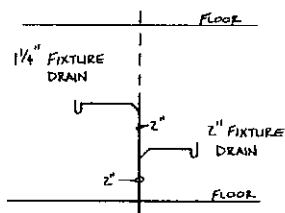


COMMON VENTS SERVING TWO LAVATORIES OR
TWO COMPARTMENTS OF ONE KITCHEN SINK

A-82.31 (12) Island fixture venting.

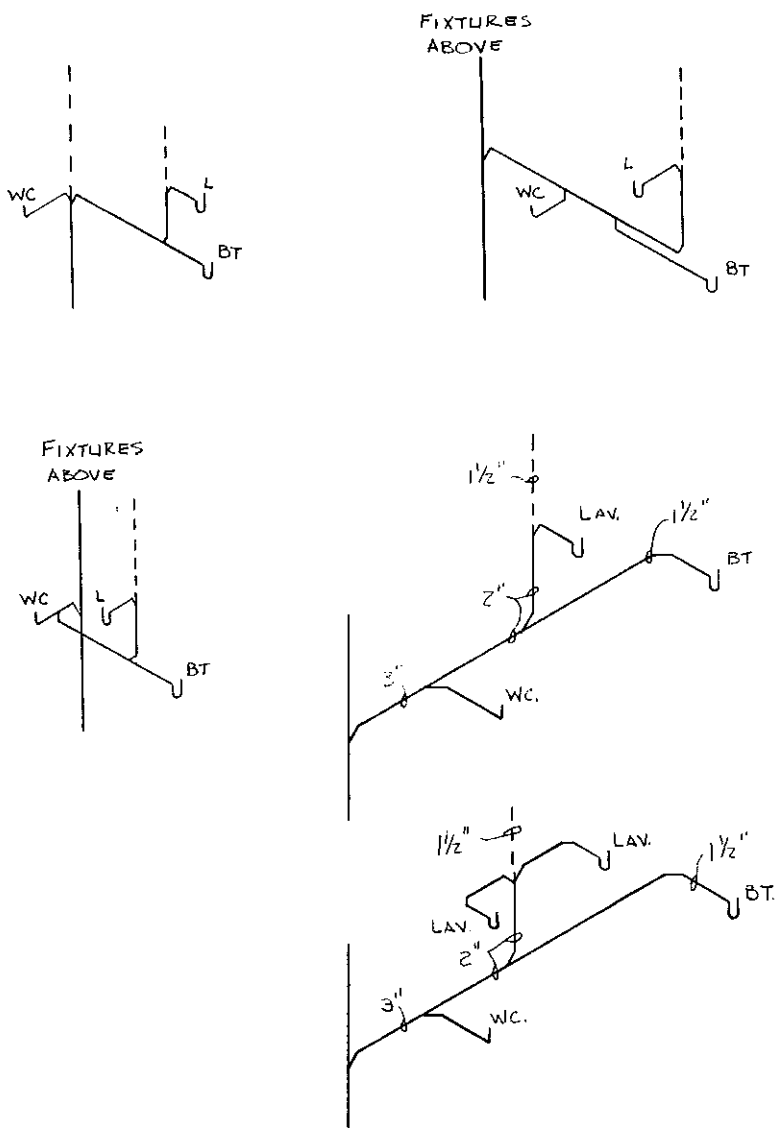


A-82,31 (13) (a) Vertical wet vents.

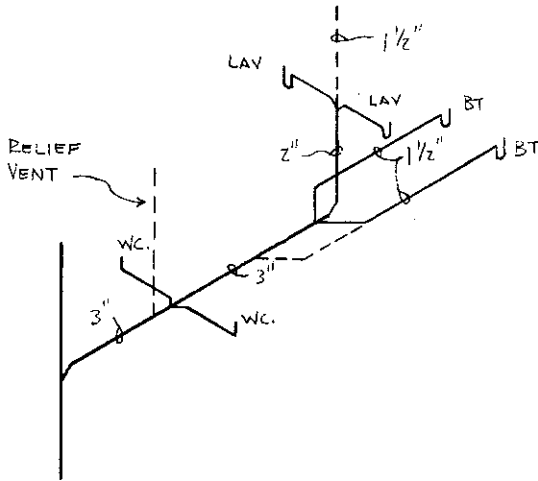


VERTICAL WET VENT

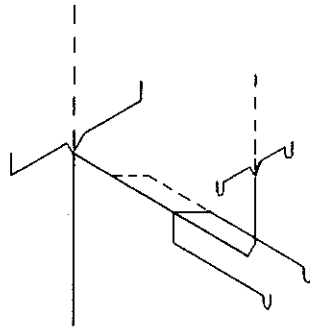
A-82.31 (13) (b) Horizontal wet vents.



A-82.31 (13) (b) Horizontal wet vents.

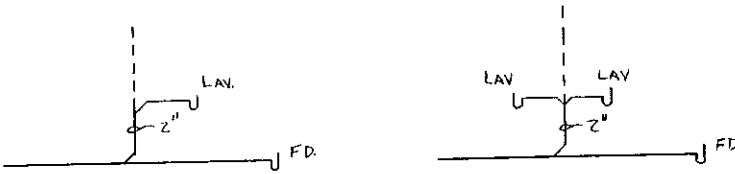


HORIZONTAL WET VENTS



BACK-TO-BACK TOP FLOOR

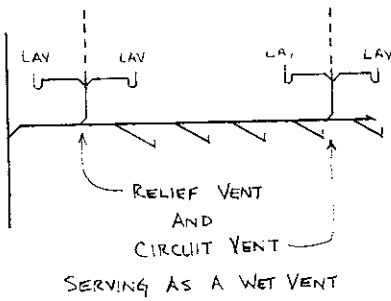
A-82.31 (13) (c) Wet venting - floor outlet fixtures.



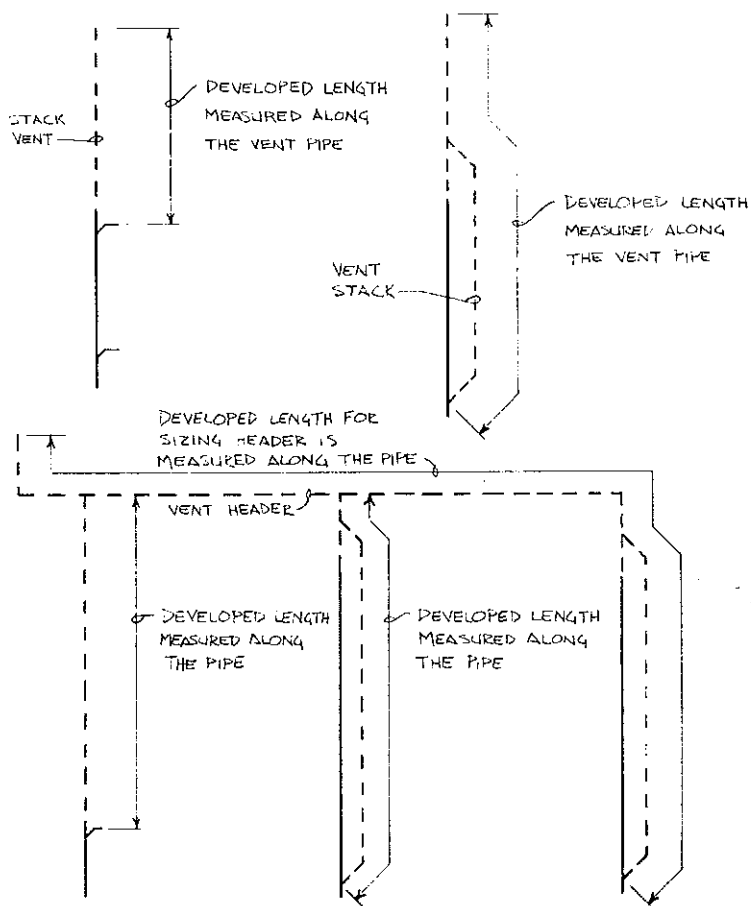
INDIVIDUAL VENT FOR FLOOR OUTLET FIXTURE
SERVING AS A WET VENT



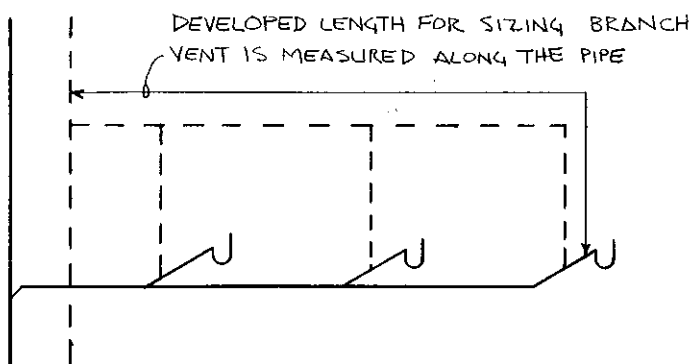
COMMON VENT FOR FLOOR OUTLET FIXTURES
SERVING AS A WET VENT



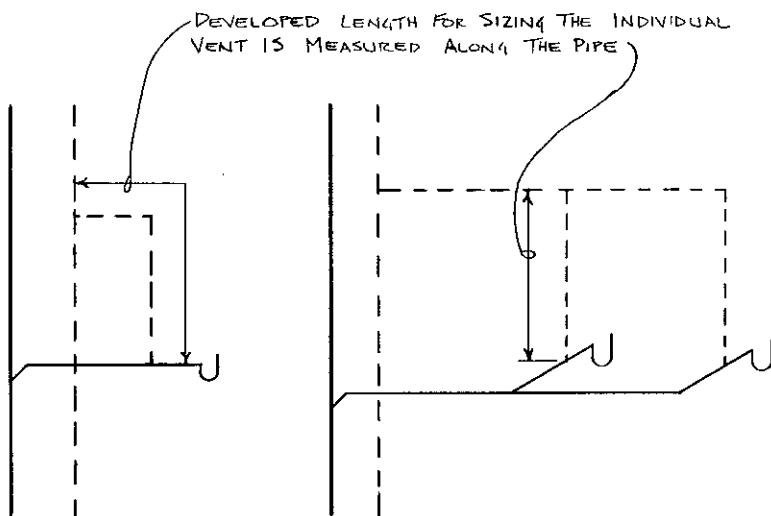
A-82.31 (14) (a) and (b) Sizing vent stacks and stack vents.



A-82.31 (14) (c) Sizing branch vents.

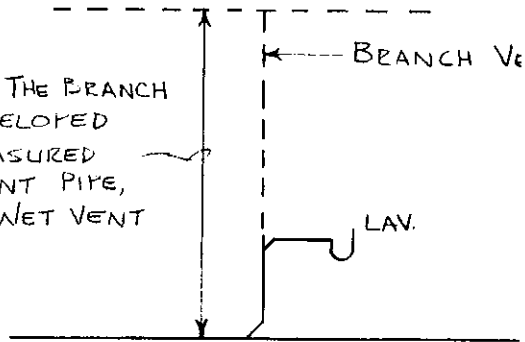


A-82.31 (14) (d) Sizing individual vents.

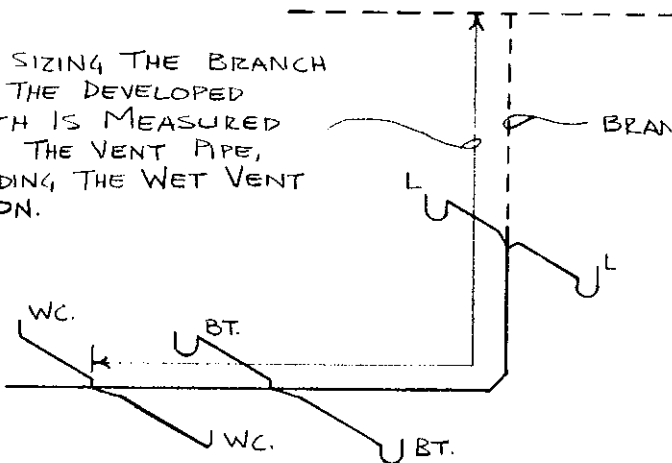


A-82.31 (14) (c) Sizing branch vents serving a wet vent.

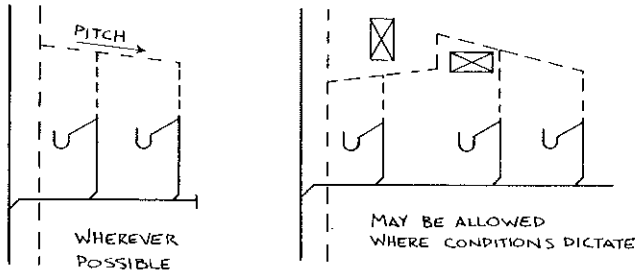
WHEN SIZING THE BRANCH VENT, THE DEVELOPED LENGTH IS MEASURED ALONG THE VENT PIPE, INCLUDING THE WET VENT PORTION.



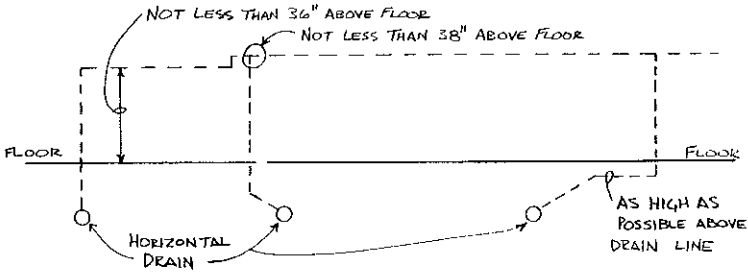
WHEN SIZING THE BRANCH VENT, THE DEVELOPED LENGTH IS MEASURED ALONG THE VENT PIPE, INCLUDING THE WET VENT PORTION.



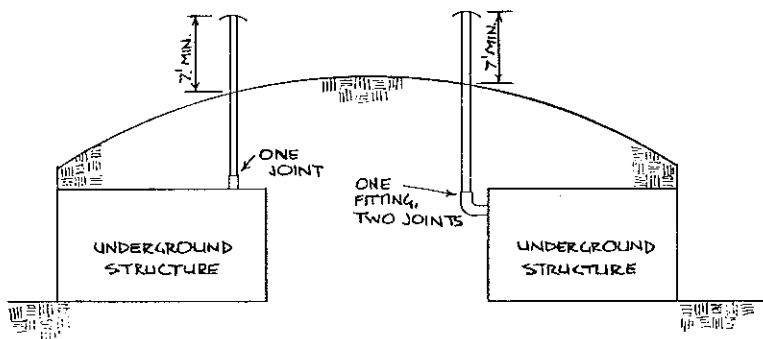
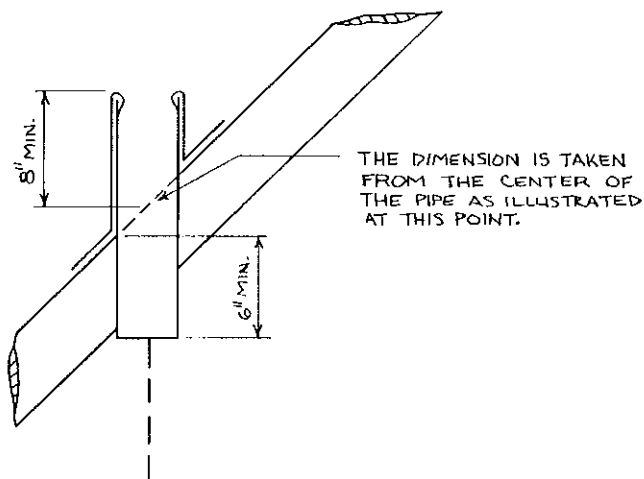
A-82.31 (15) (a) Vent grades and connections.



A-82.31 (15) (b) Vent grades and connections.

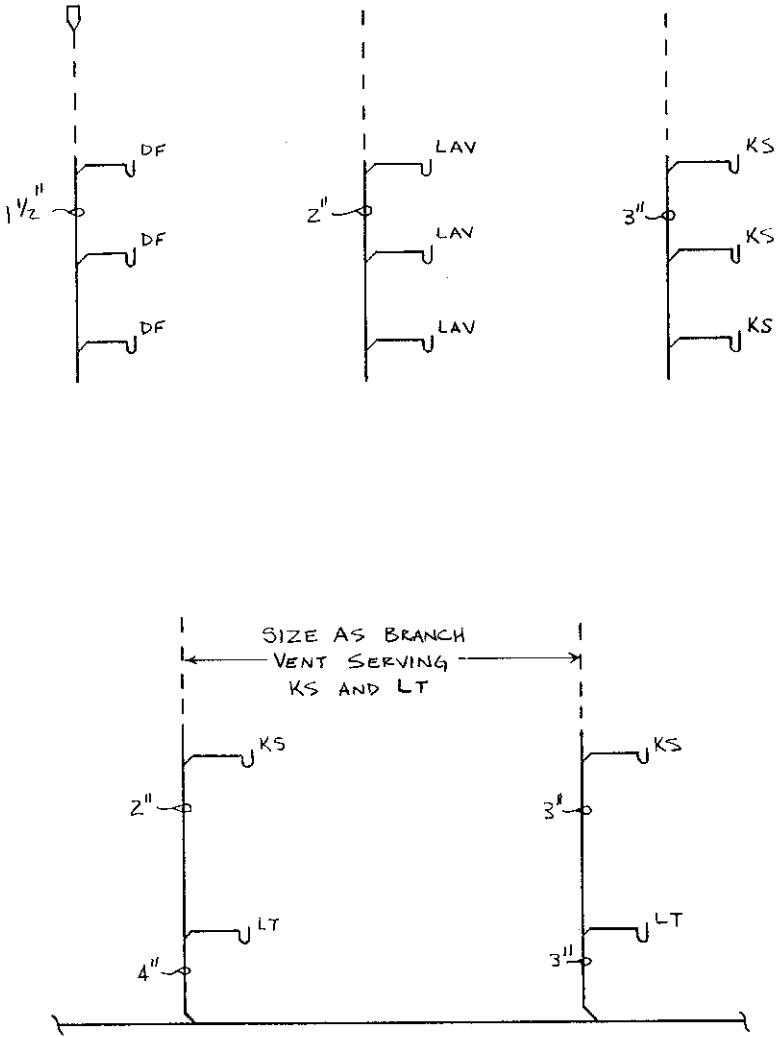


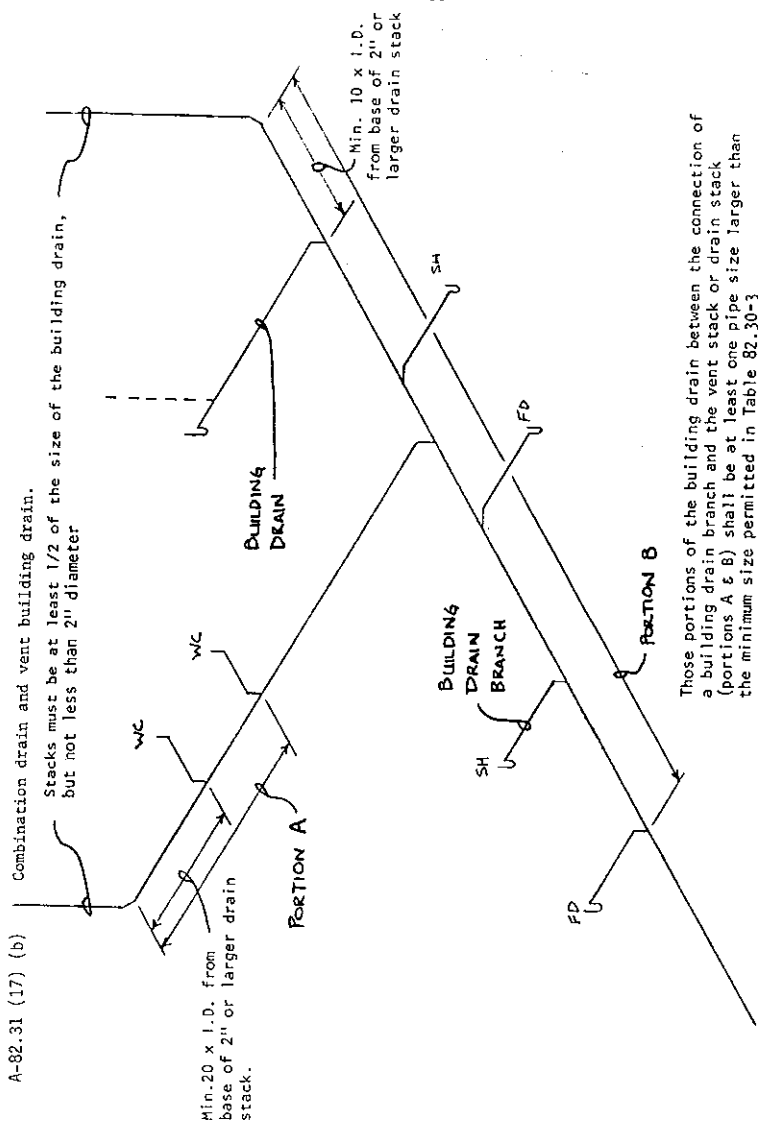
A-82.31 (16) Vent terminals.



VENT TERMINALS FOR UNDERGROUND STRUCTURES

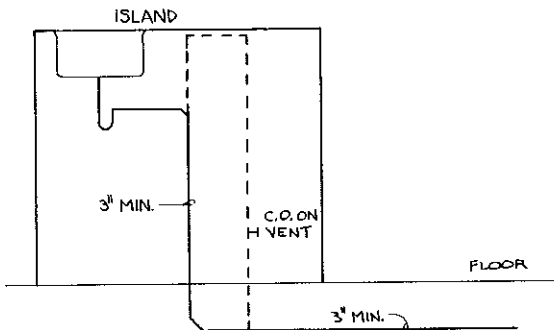
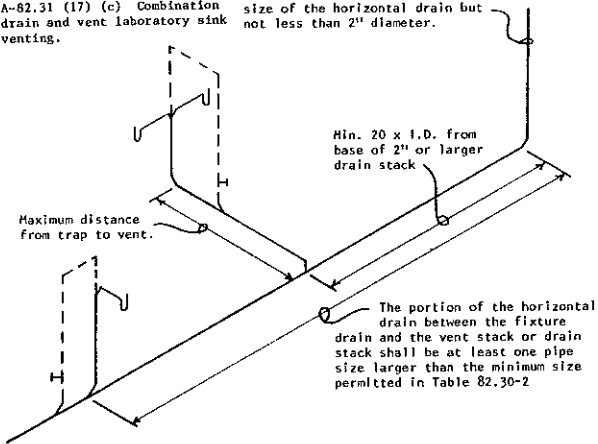
A-82.31 (17) (a) Combination drain and vent stacks.



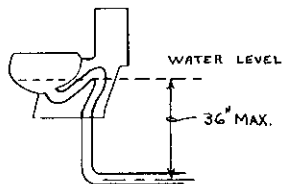
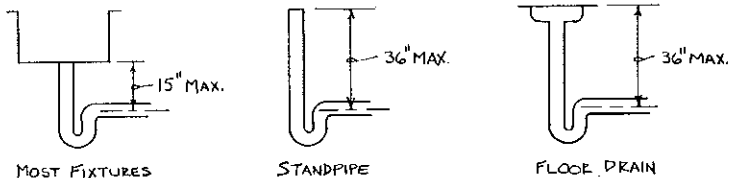


A-82.31 (17) (c) Combination drain and vent laboratory sink venting.

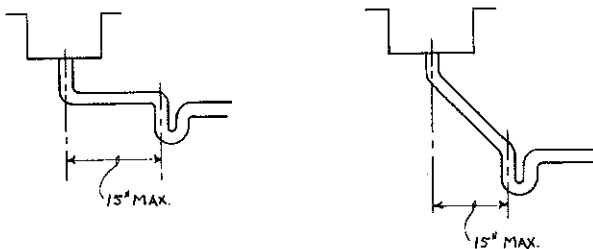
Stack must be at least 1/2 of the size of the horizontal drain but not less than 2" diameter.



A-82.32 (4) (b) Installation of traps.

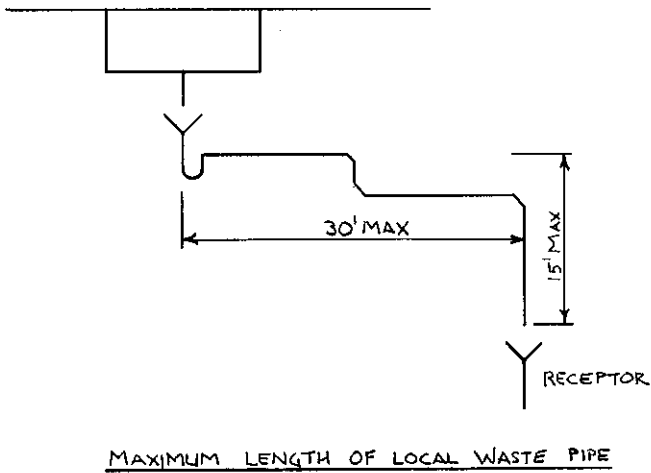
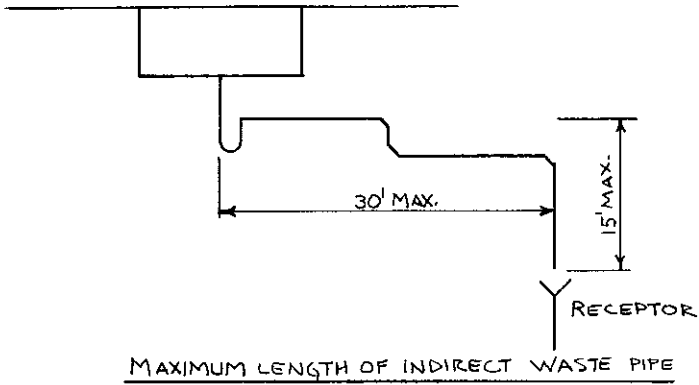


VERTICAL DISTANCE BETWEEN FIXTURE DRAIN OUTLET AND TRAP

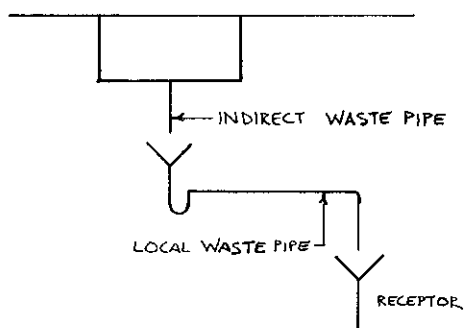
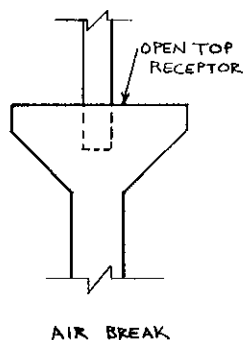
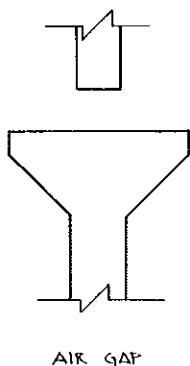


HORIZONTAL DISTANCE BETWEEN FIXTURE DRAIN OUTLET AND TRAP

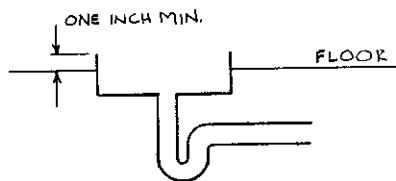
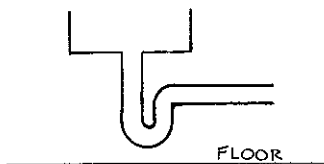
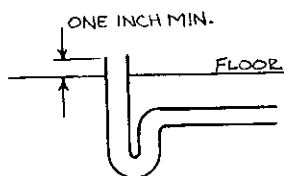
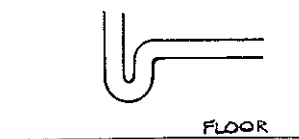
A-82.33 (6) Indirect and local waste piping.



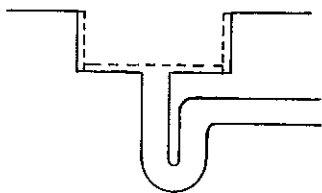
A-82.33 (7) Air-gaps and air-breaks.



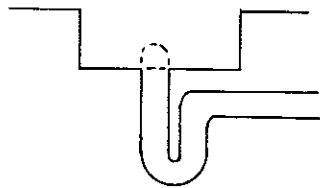
A-82.33 (8) (a) Waste sinks and standpipes.

WASTE SINK IN FLOORWASTE SINK ABOVE FLOORSTANDPIPE IN FLOORSTANDPIPE ABOVE FLOOR

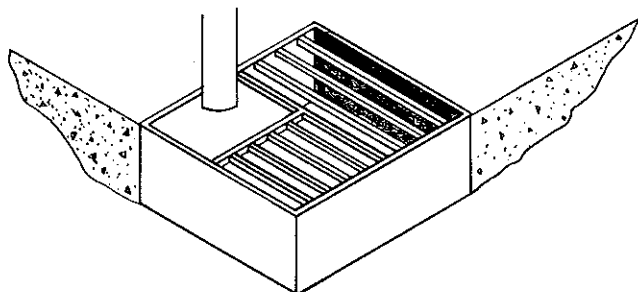
A-82.33 (8) (b) Floor sinks.



FLOOR SINK WITH BASKET

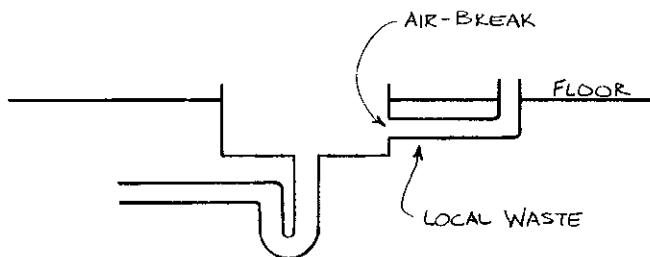


FLOOR SINK WITH DOME STRAINER

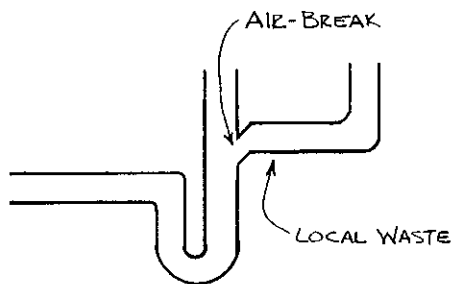


FLOOR SINK WITH GRATE OPENING
FOR AIR GAP

A-82.33 (8) (c) Local waste piping.

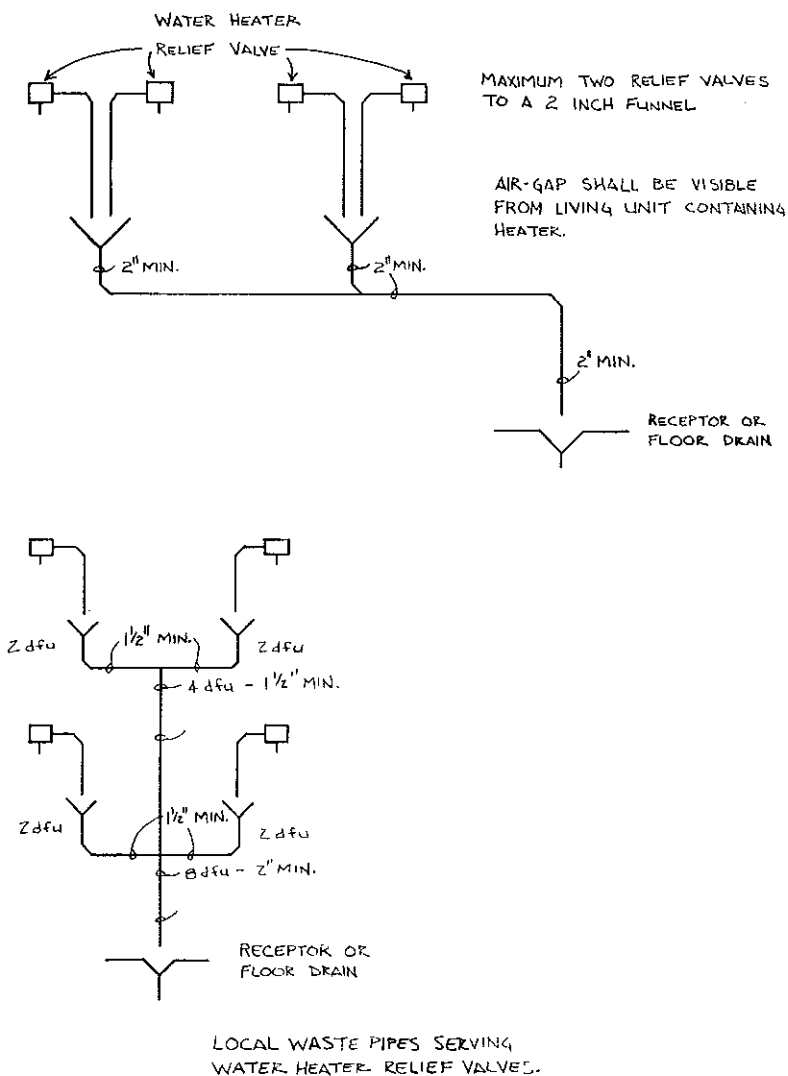


LOCAL WASTE LEADING TO A WASTE SINK,
FLOOR SINK OR FLOOR DRAIN



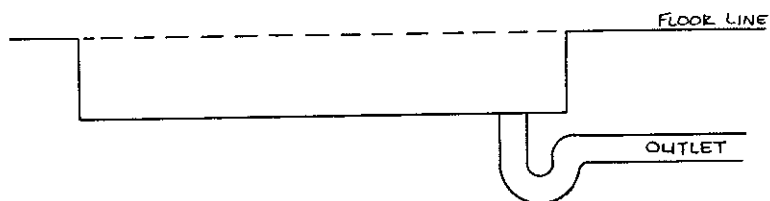
LOCAL WASTE LEADING TO A STANDPIPE

A-82.33 (8) (c) Local waste piping serving water heater relief valves.

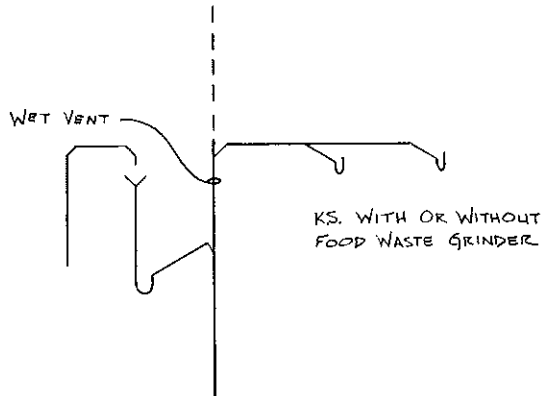
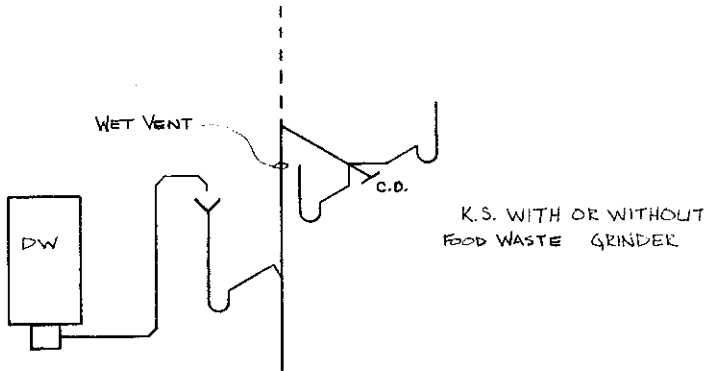


A-82.33 (9) (c) Commercial gravity discharge-type clothes washers.

TRENCH TYPE LAUNDEY RECEPTOR

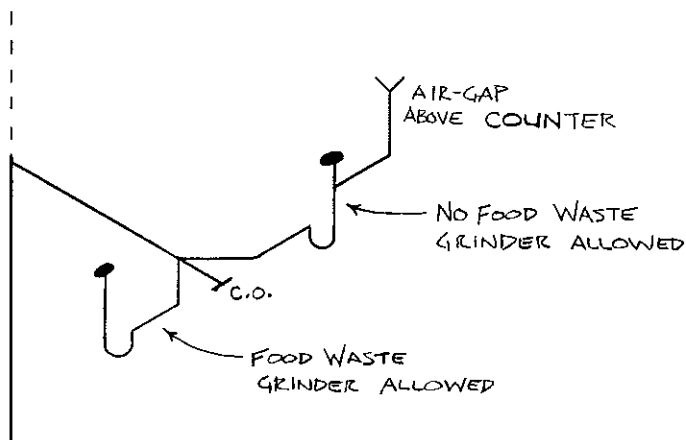
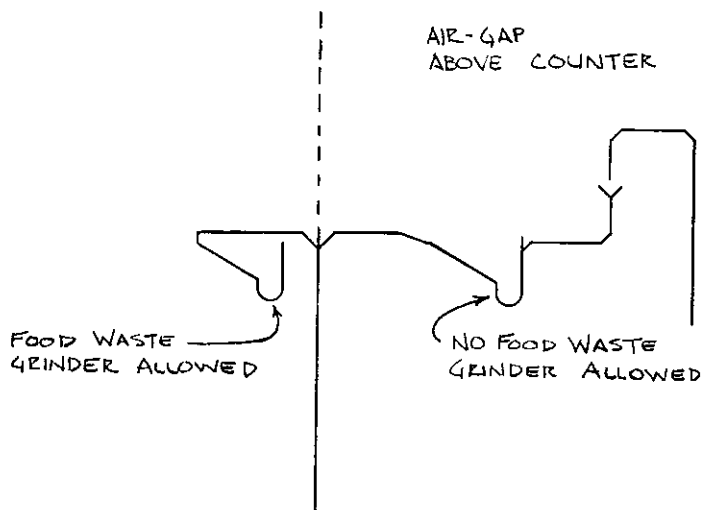


A-82.33 (9) (d) Residential-type dishwashers.

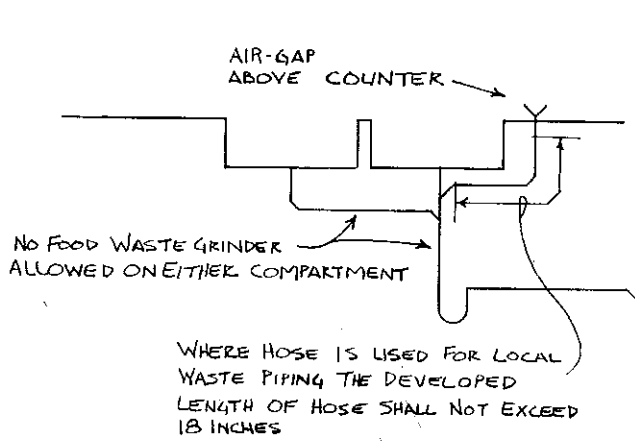
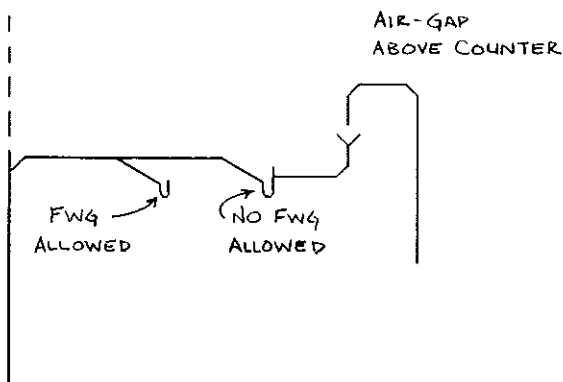


DISHWASHER DISCHARGING TO A STANDPIPE
BELOW THE COUNTER TOP.

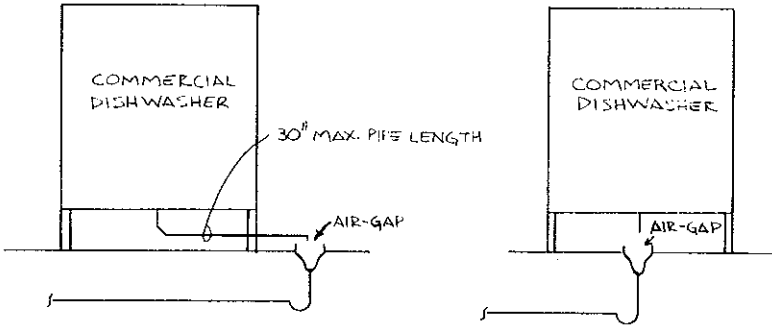
A-82.33 (9) (d) Residential-type dishwashers.



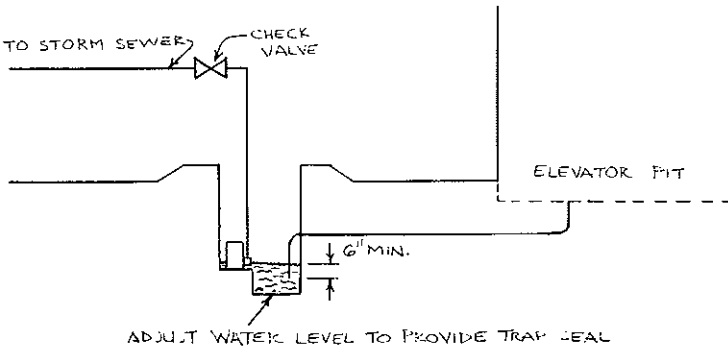
A-82.33 (9) (d) Residential-type dishwashers.



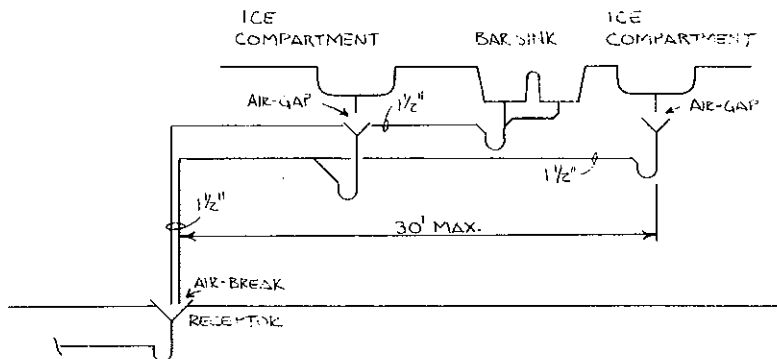
A-82.33 (9) (d) Commercial dishwashers.



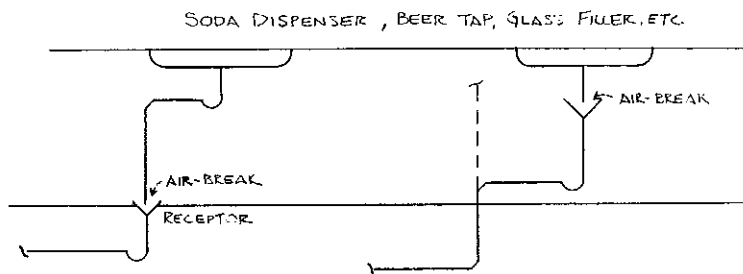
A-82.33 (9) (f) Elevator pit subsoil and floor drains.



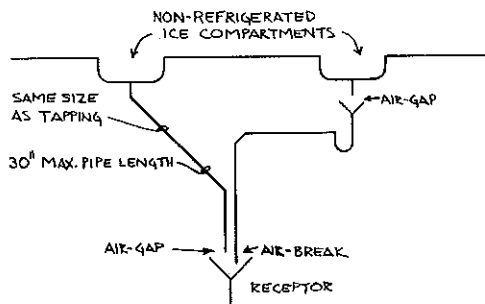
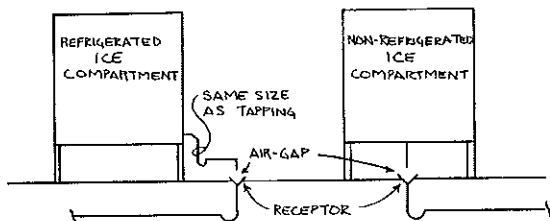
A-82.33 (9) (g) 1. Bar and soda fountain sinks.



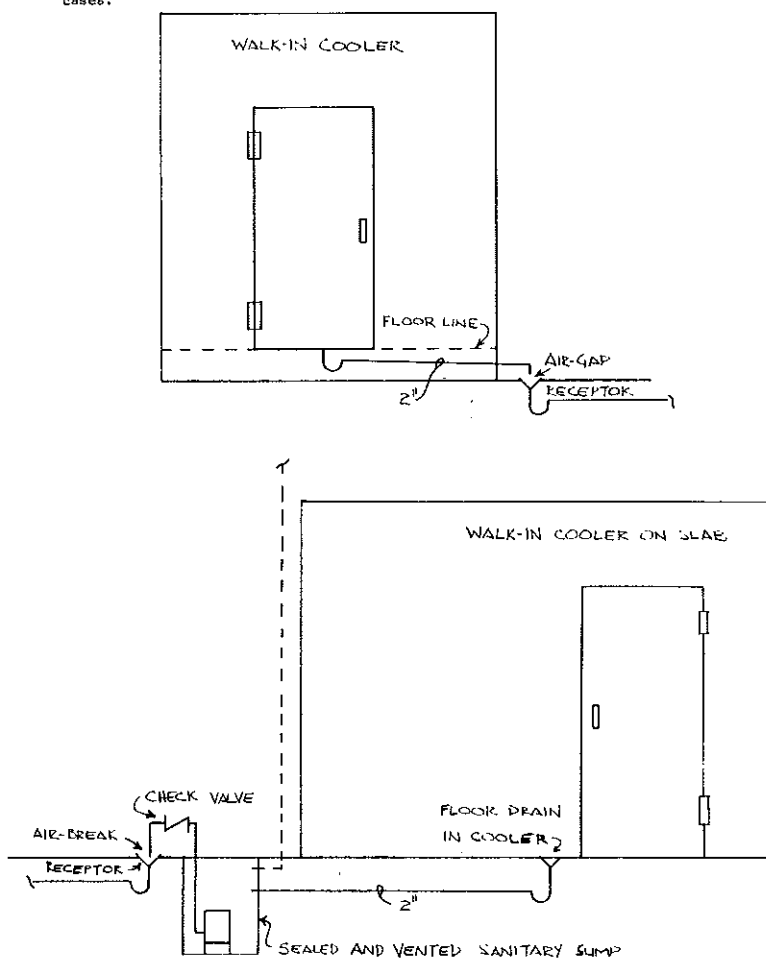
A-82.33 (9) (g) 2.



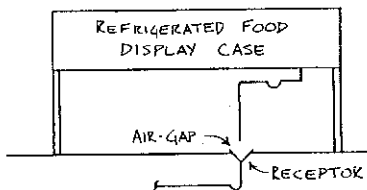
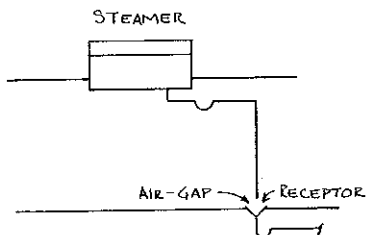
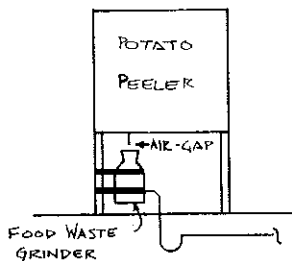
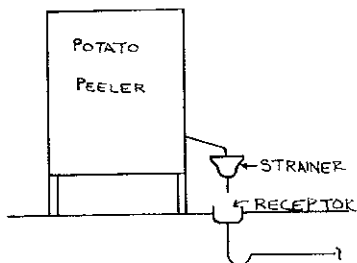
A-82.33 (9) (g) 3. Novelty boxes, ice compartments and ice cream dipper wells.



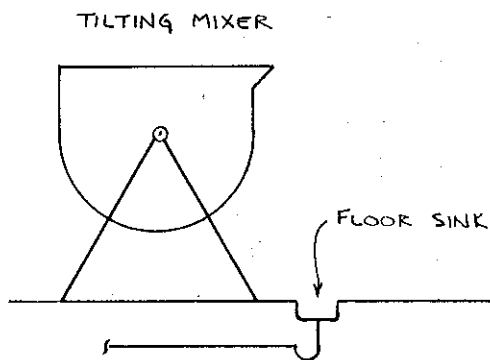
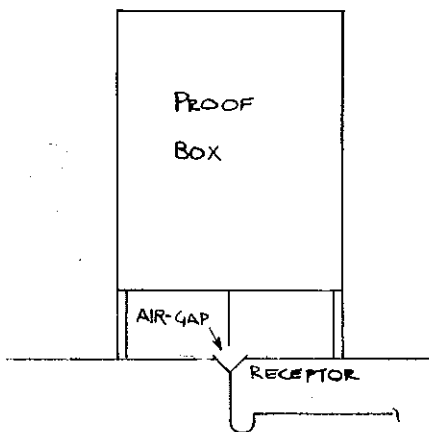
A-82.33 (9) (g) 4. Refrigerated food storage rooms, compartments, and display cases.



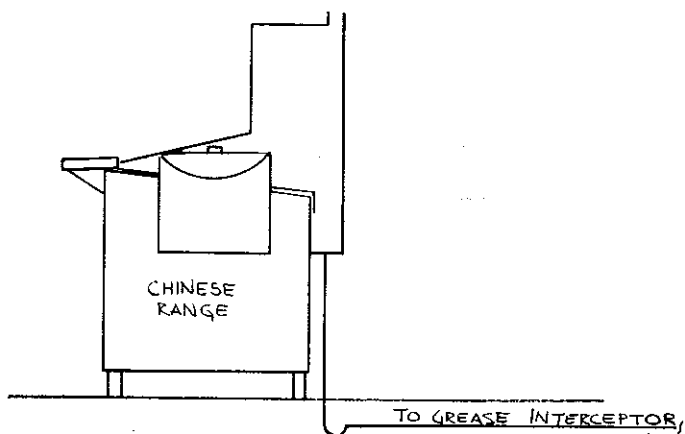
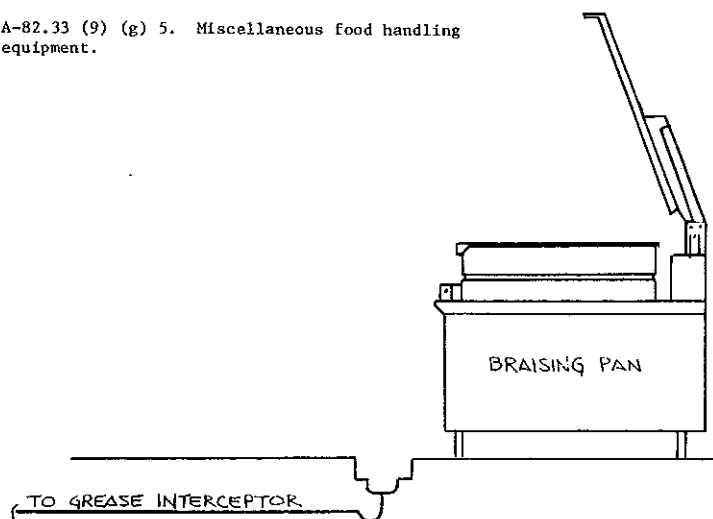
A-82.33 (9) (g) 5. Miscellaneous food handling equipment.



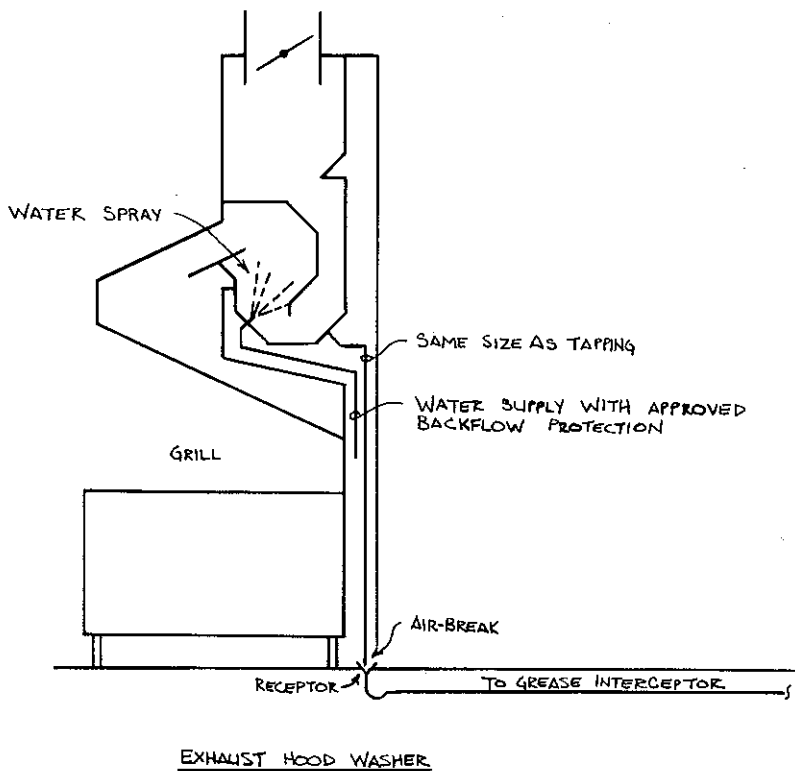
A-82.33 (9) (g) 5. Miscellaneous food handling equipment.



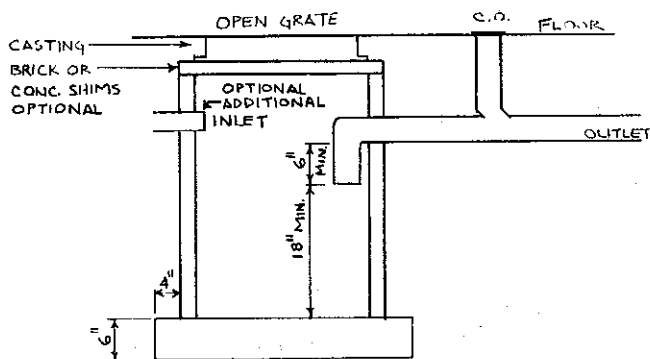
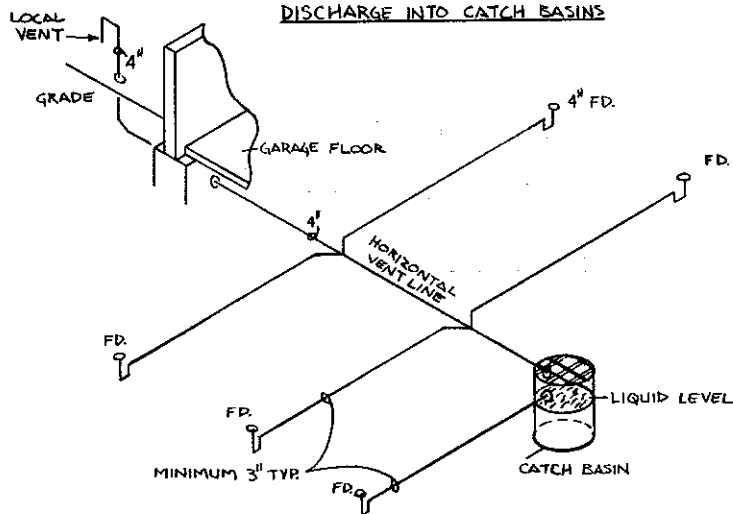
A-82.33 (9) (g) 5. Miscellaneous food handling equipment.



A-82.33 (9) (g) 5. Miscellaneous food handling equipment.



A-82.34 (4) (a)

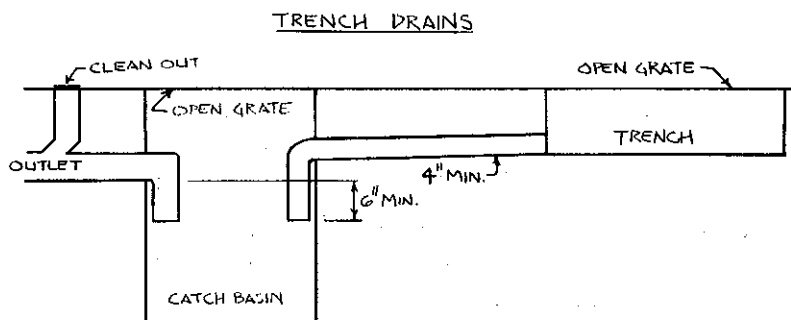
GARAGE CATCH BASINDISCHARGE INTO CATCH BASINS

A-82.34 (4) (a)

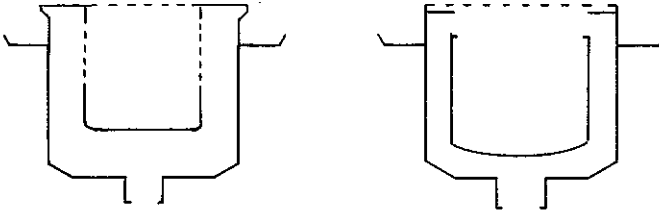
Capacity of Catch Basins
(in cubic feet)

Diameter of Catch Basin	Volume in cubic feet per foot of depth	Diameter of Catch Basin	Volume in cubic feet per foot of depth
36	7.1	45	11.1
37	7.5	46	11.6
38	7.9	47	12.1
39	8.3	48	12.6
40	8.7	54	15.9
41	9.2	60	19.7
42	9.7	66	23.8
43	10.1	72	28.3
44	10.6	84	38.6

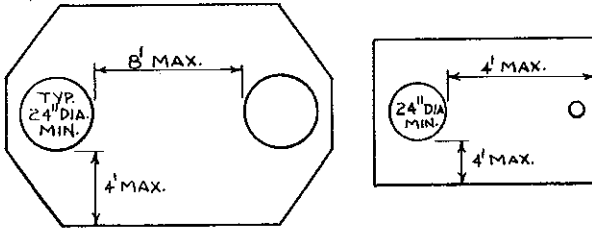
A-82.34 (4) (a)



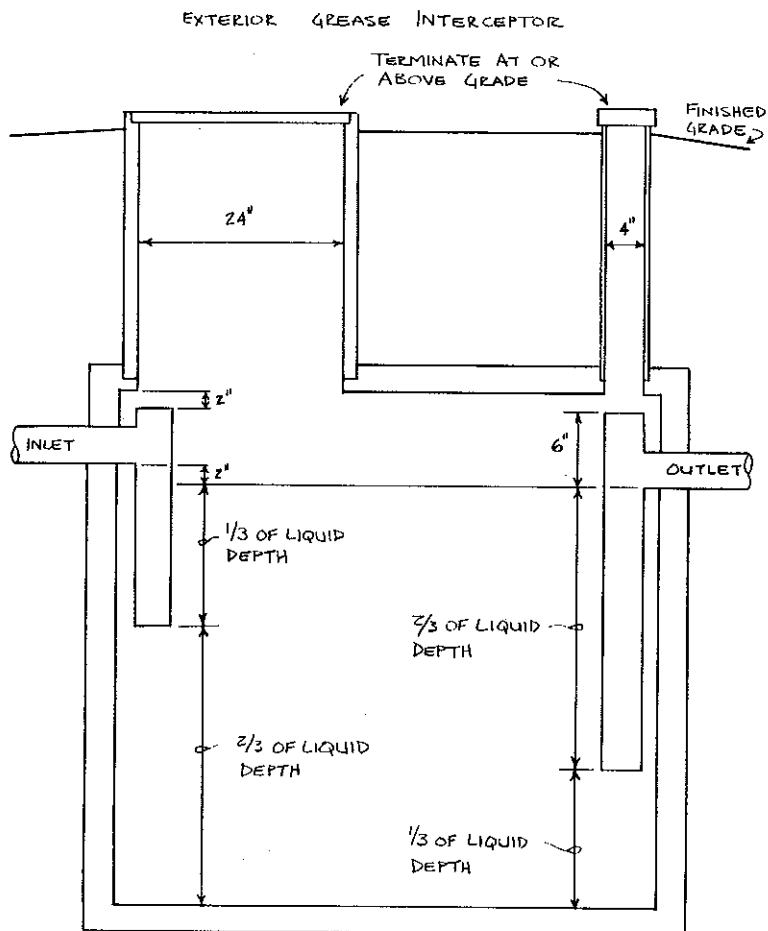
A-82.34 (4) (b)

TYPICAL FLOOR DRAIN WITH SOLID BOTTOM SEDIMENT BASKET

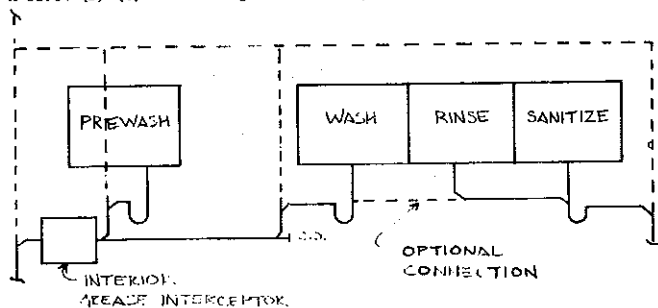
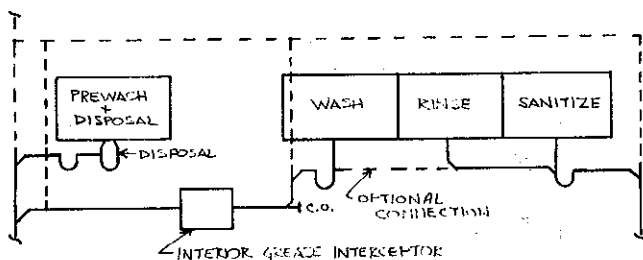
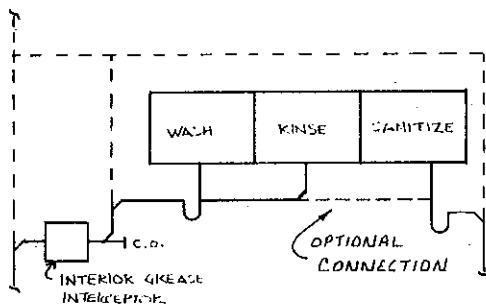
A-82.34 (5) (b)

GREASE INTERCEPTOR MANHOLE LOCATION

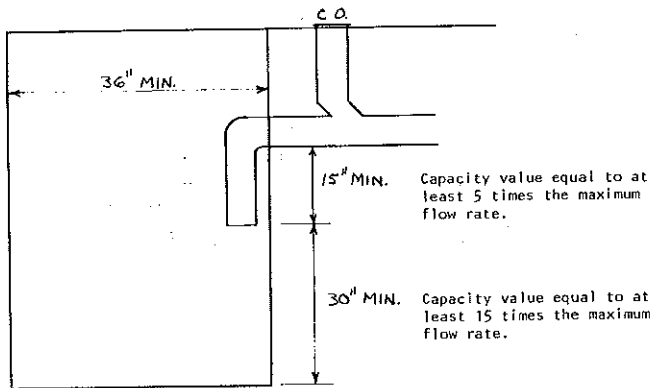
A-82.34 (5) (b)



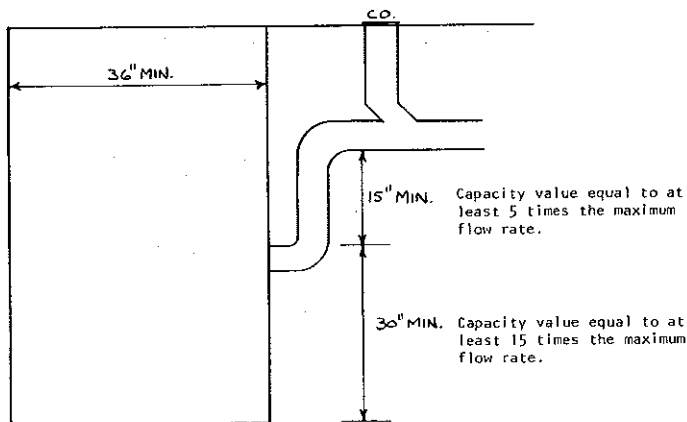
A-82.34 (5) (c) Interior grease interceptors.

PREWASH AND 2-COMPARTMENT SCULLERY SINKPREWASH + DISPOSAL + 3-COMPARTMENT SCULLERY SINK3-COMPARTMENT SCULLERY SINK

A-82.34 (6) Automatic car washes.

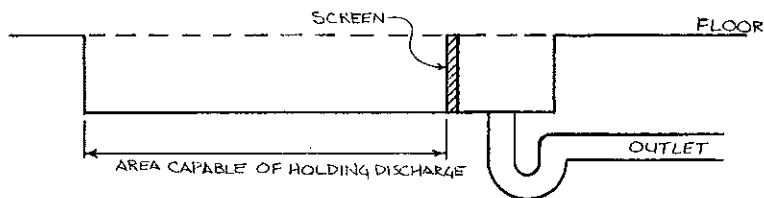
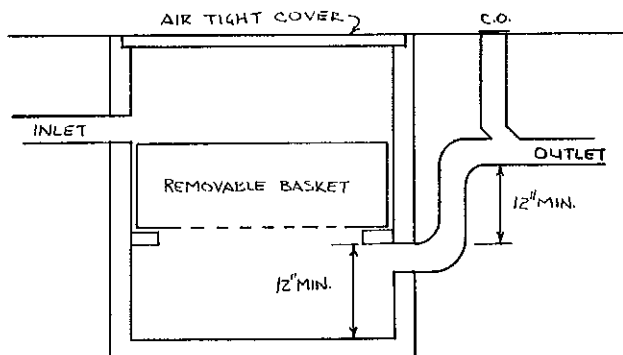


CAR WASH INTERCEPTOR WITH CAST IRON INVERT INSIDE OF BASIN

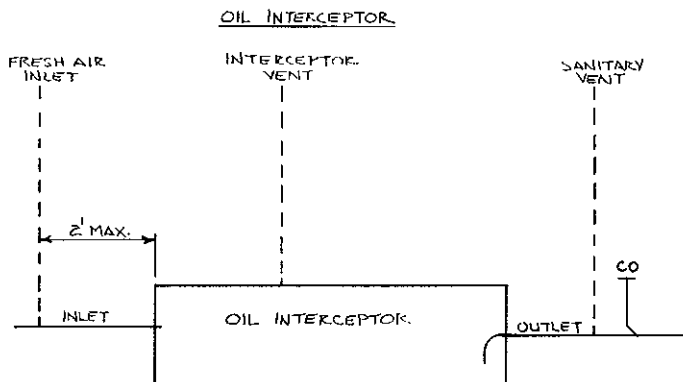


CAR WASH INTERCEPTOR WITH INVERT OUTSIDE OF BASIN

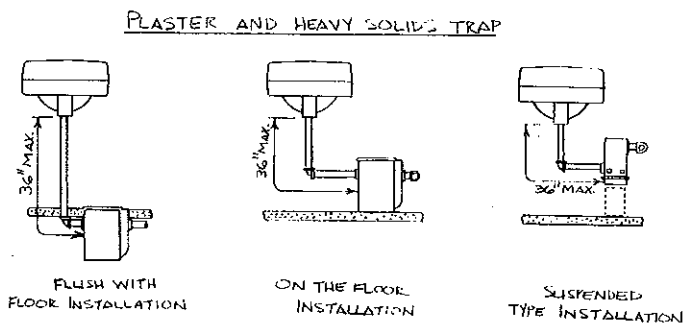
A-82.34 (7) Commercial laundries.

TRENCH TYPE LAUNDRY INTERCEPTORIN-LINE LAUNDRY INTERCEPTOR

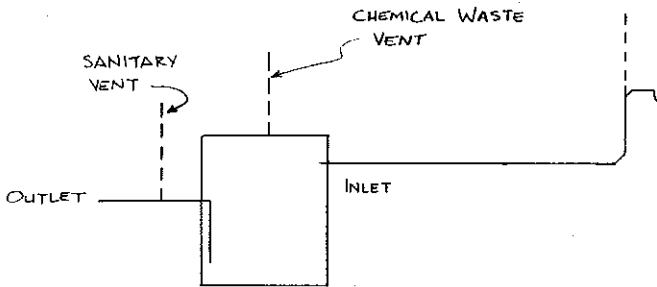
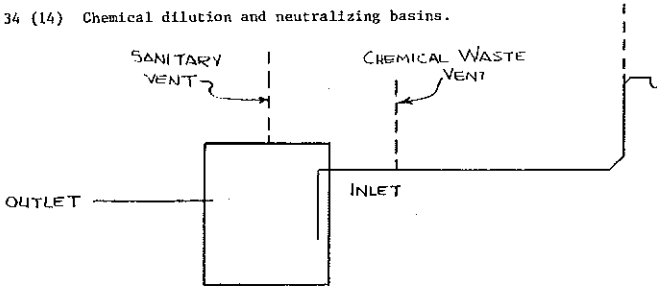
A-82.34 (8)



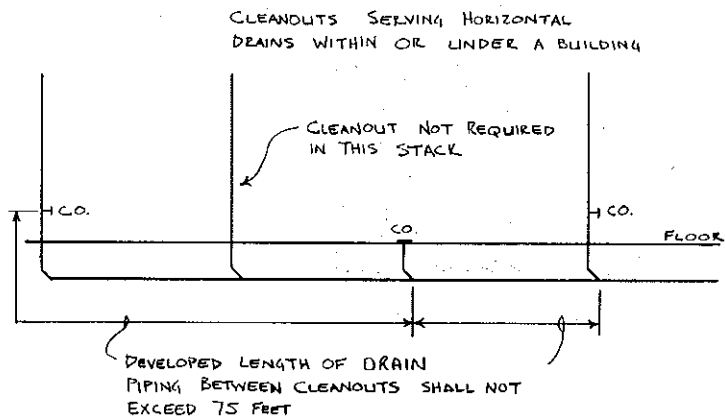
A-82.34 (13)



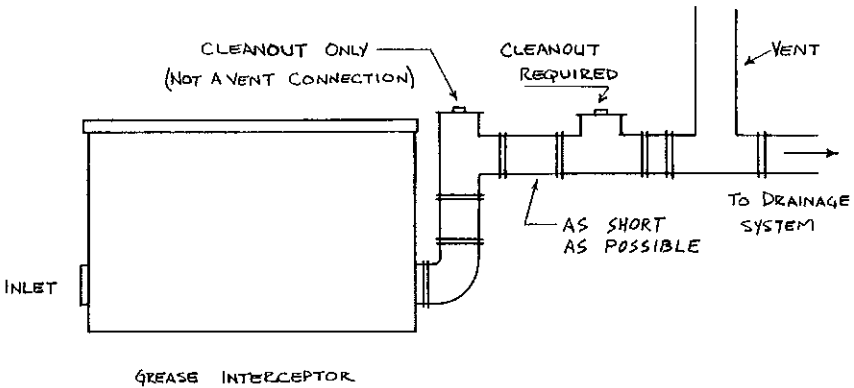
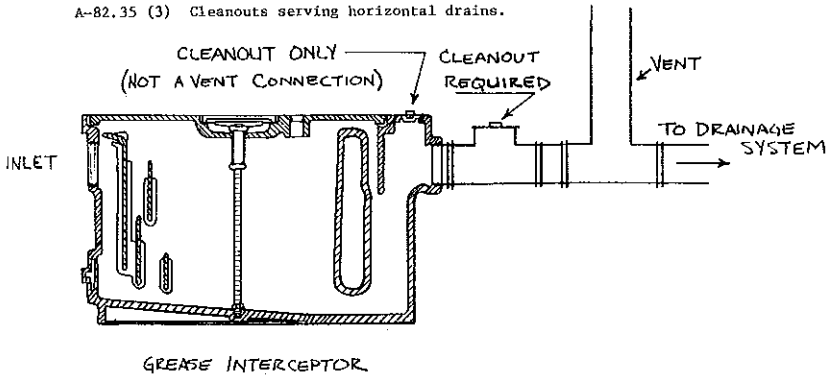
A-82.34 (14) Chemical dilution and neutralizing basins.



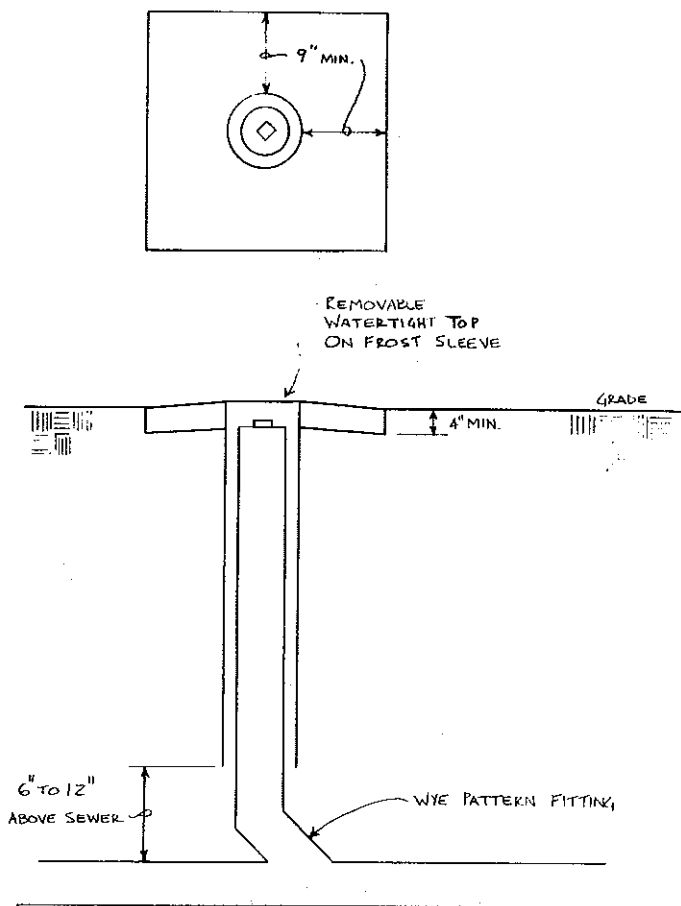
A-82,35 (3)



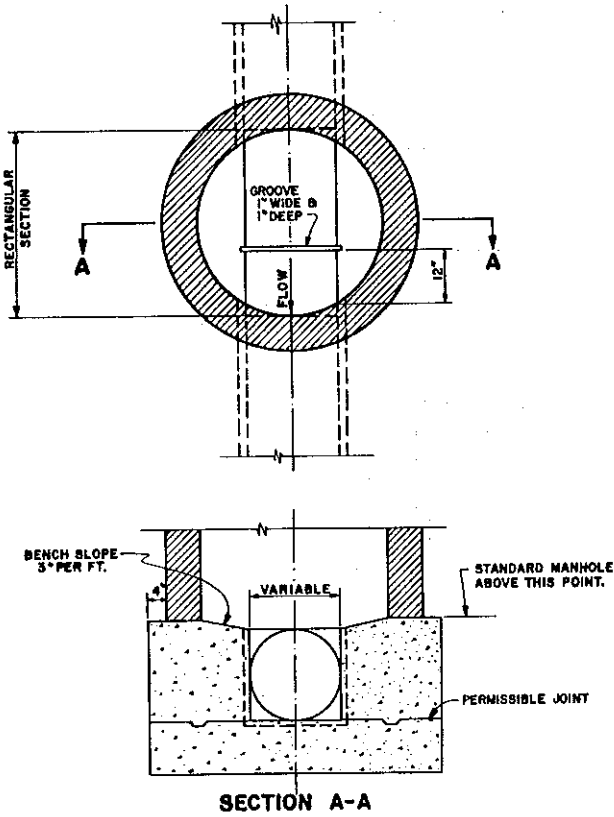
A-82.35 (3) Cleanouts serving horizontal drains.



A-82.34 (5) (a) Cleanout extension to grade.



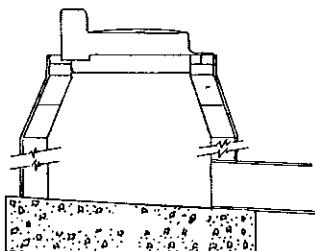
A-82.35 (8)



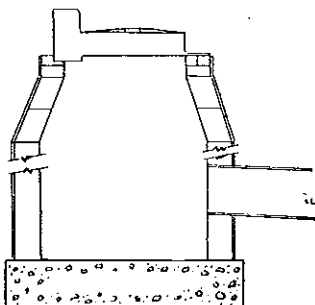
SECTION A-A

**DETAIL OF
SAMPLING MANHOLE**

A-82.36 (17) Area drain inlets.



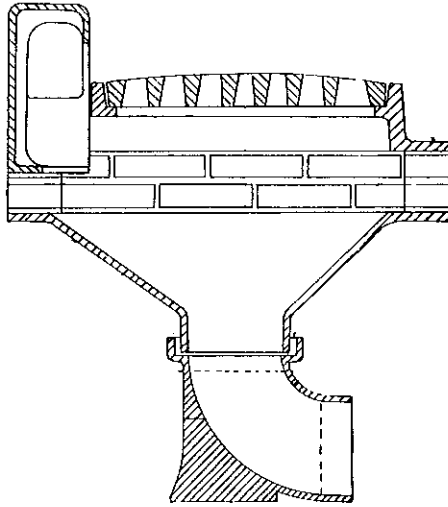
**STANDARD STORM WATER
INLET (MASONRY)**



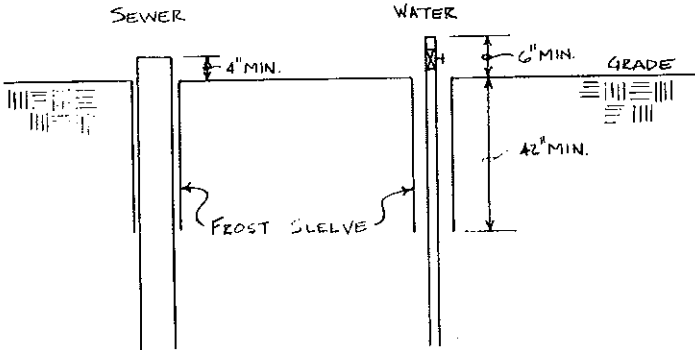
**STANDARD STORM WATER
CATCH BASIN (MASONRY)**

A-82.36 (17) Area
drain inlets.

CAST IRON STORM
WATER INLET

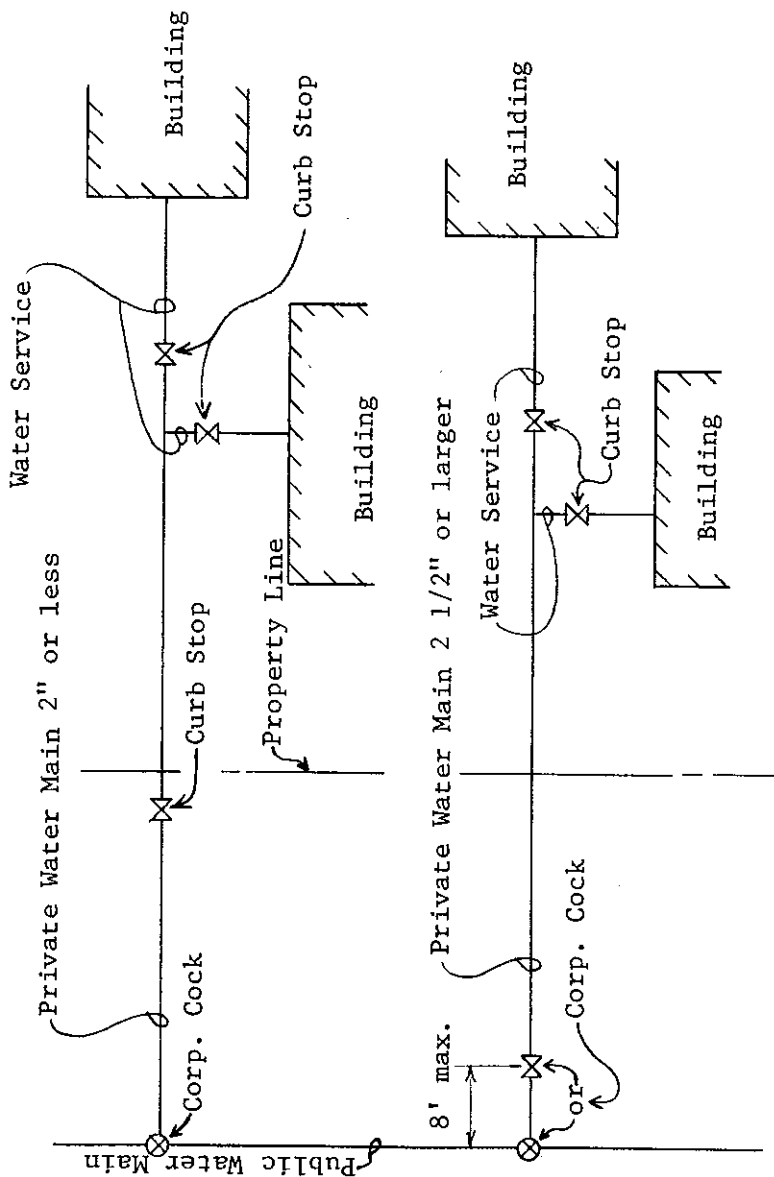


A-82.51 (3) Mobile home sites and parks.

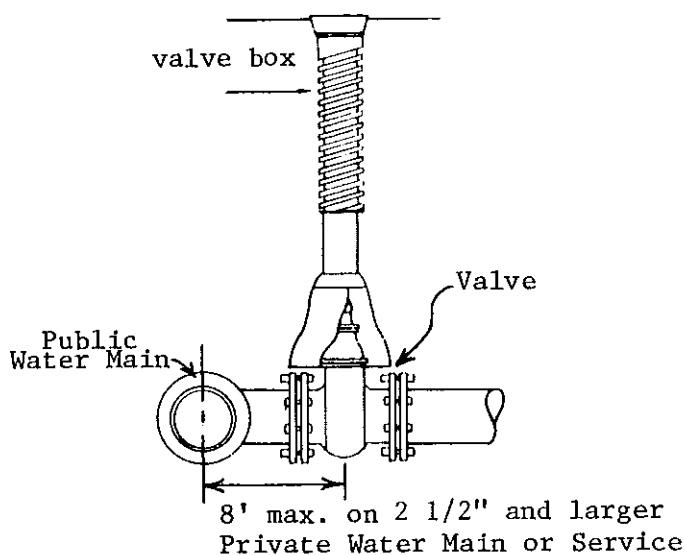
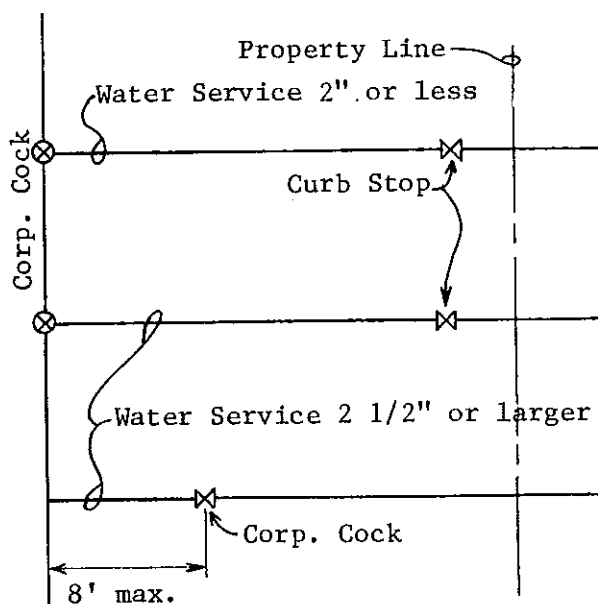


MOBILE HOME BUILDING SEWER AND
WATER SERVICE TERMINATIONS

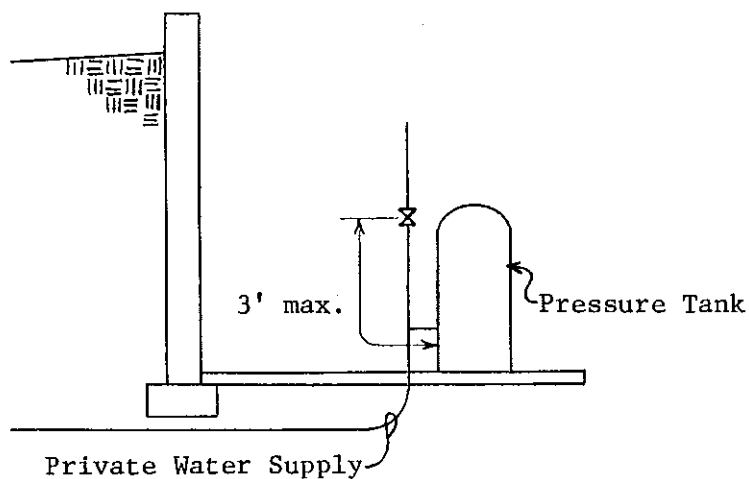
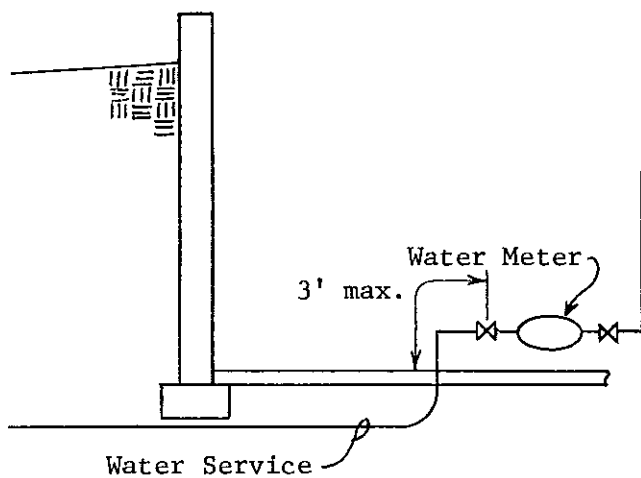
A-82.40 (4)



A-82.40 (4) b)



A-82.40 (4) (b)



A-82.40 (7) (a)

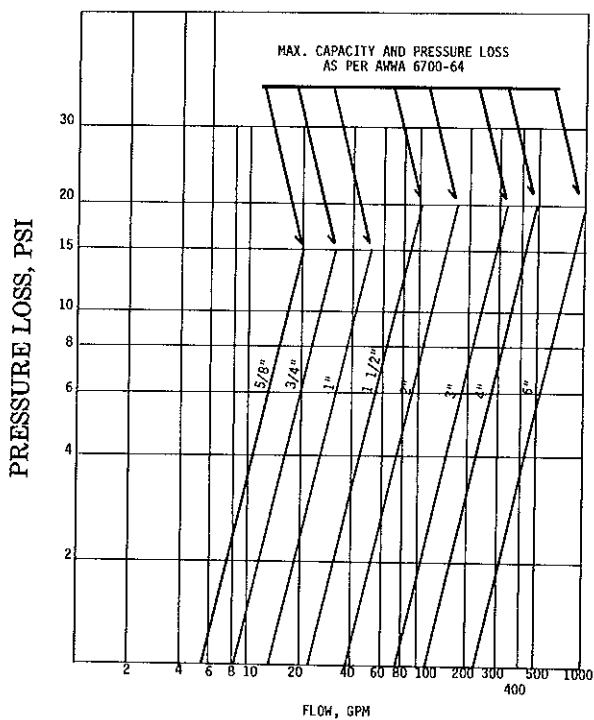
Where equipment such as an instantaneous or tankless water heater, water treatment device, water meter, and backflow preventer is provided in the design, the friction loss in such equipment, corresponding to the GPM demand, should be determined from the manufacturer or other reliable source.

Where a direct fired pressurized tank type water heater is provided in the design, the friction loss for such equipment can be assumed as part of the pressure losses due to flow through piping, fittings, valves and other plumbing appurtenances when the developed length of piping is multiplied by 1.5.

The pressure losses due to flow friction through displacement type cold-water meters may be calculated from Graph A-82.40 (7) (a)-1.

Graph A-82.40 (7)-1

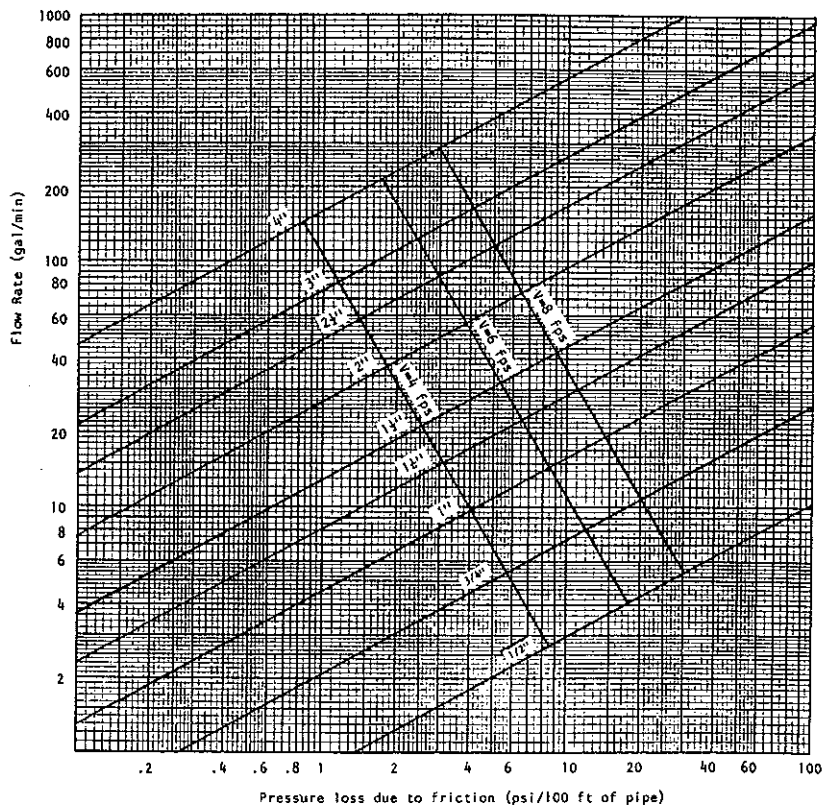
PRESSURE LOSS IN COLD-WATER METERS, DISPLACEMENT TYPE



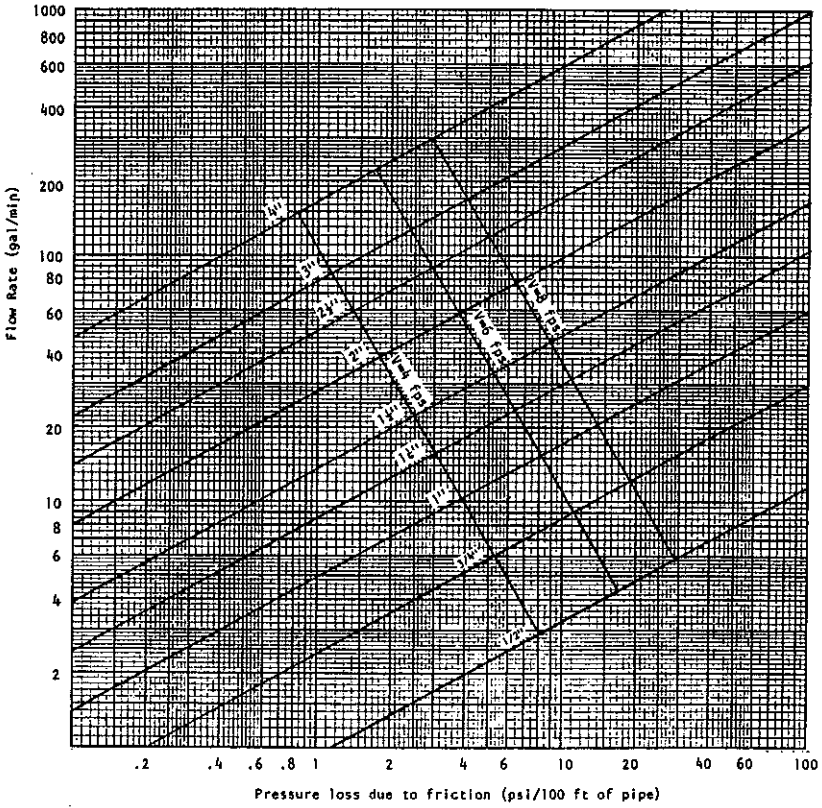
A-82.40 (7) (b)

Graph A-82.40 (7)-2 to A-82.40 (7)-5 may be used to size private water mains and water services.

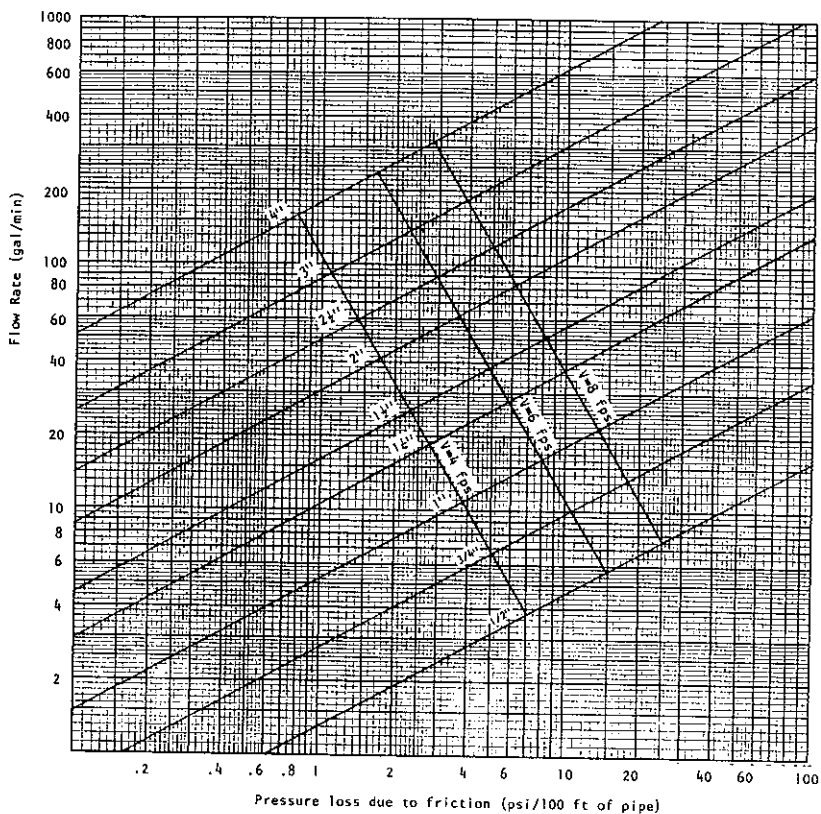
Graph A-82.40 (7)-2



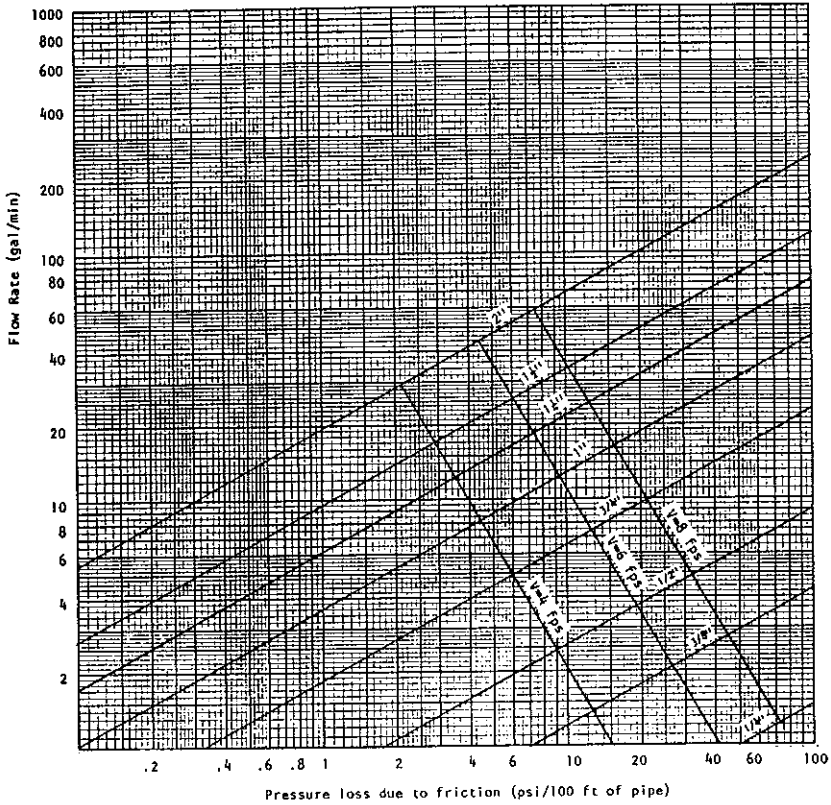
Graph A-82.40 (7)-3



Graph A-82.40 (7)-4



Graph A-82.40 (7)-5



INDEX

See also first page of the chapter for the listing of section headings.

A

	<i>ILHR Section No(s).</i>
ACCESS	
To backwater valves.....	82.30 (11) (a) 2. b.
To cleanouts	82.35 (5)
To fixture traps.....	82.32 (4) (a), 82.35 (3) (j)
To floor drains	82.32 (5) (a)
To interceptors	82.34 (3) (f)
ADMINISTRATION AND ENFORCEMENT.....	82.20, 82.21
Petition for variance	82.20 (11)
Plan review and approval	82.20 (1) (a), 82.20 (1) (b)
Priority plan review	82.20 (3)
AGENT MUNICIPALITIES.....	82.20 (2)
AIR BREAK	
Definition.....	82.11 (3)
Installation	82.33 (7) (b)
Required.....	82.33 (9)
AIR GAP	
Definition.....	82.11 (4), 82.11 (5)
Installation	82.33 (7) (a)
Required.....	82.33 (9)
AIR INTAKE	
Distance to vent terminal	82.31 (16) (d)
AIR TEST	82.21 (1) (d)
AREA DRAINS	82.36 (17)
AREAWIDE WATER QUALITY MANAGEMENT PLAN	
Definition.....	82.11 (11)
Conformance.....	82.20 (4) (c)
ASPIRATOR	82.41 (1) (h)
ATMOSPHERIC VACUUM BREAKER....	82.41 (1) (l), 82.41 (1) (p)
AUTOPSY TABLE.....	82.41 (1) (h)

B

BACKFILLING.....	82.30 (11) (d)
BACKFLOW PREVENTER	
Definition.....	82.11 (17)
Required.....	82.41
BACKFLOW PROTECTION.....	82.41
BACKWATER VALVES	
Accessibility.....	82.30 (11) (a) 2. b.
Definition.....	82.11 (19)
Where required	82.30 (11) (a) 2.
BAROMETRIC LOOP.....	82.41 (1) (p)
BEDDING FOR SEWERS	82.30 (11) (d) 2.
BOTTLING ESTABLISHMENTS	82.34 (9)
BRANCH INTERVAL	
Definition.....	82.11 (29)
Loading limits.....	82.30 (4) (a)

BUILDING DRAIN

Definition.....	82.11 (34)
Installation.....	82.30 (11)
Sizing, sanitary.....	82.30 (4) (a), 82.30 (4) (b)
Sizing, storm.....	82.36 (5)

BUILDING SEWERS

Connections to main.....	82.30 (11) (e)
Definition.....	82.11 (38), 82.11 (39), 82.11 (40)
Frost protection.....	82.30 (11) (b) 2.
Installation.....	82.30 (11) (d)
Sizing, sanitary.....	82.30 (4) (a), 82.30 (4) (c)
Sizing, storm.....	82.36 (5) (e)

C

CAR WASH, AUTOMATIC.....	82.34 (6)
--------------------------	-----------

CHANGES IN DIRECTION, DRAIN PIPING.....	82.30 (8)
---	-----------

CATCH BASINS, GARAGE.....	82.34 (4)
---------------------------	-----------

CHEMICAL WASTE PIPING SYSTEMS.....	82.34 (14)
------------------------------------	------------

CIRCUIT VENTS

Definition.....	82.11 (45)
Installation.....	82.31 (10)
Sizing.....	82.31 (14) (f)

CLEANOUTS

Accessibility.....	82.35 (5)
Required.....	82.35 (3)
Size.....	82.35 (6)

CLEAR WATER DRAINS

Indirect waste piping.....	82.33 (9) (b)
Segregation of wastes.....	82.36 (3) (c)
Sizing.....	82.36 (5) (c)

CLOTHES WASHERS.....	82.33 (9) (c)
----------------------	---------------

COMMON VENTS

Definition.....	82.11 (50)
Installation.....	82.31 (11)
Sizing.....	82.31 (14) (e)

CONDUCTORS

Definition.....	82.11 (51)
Sizing.....	82.36 (5) (b)

CONTINUOUS FLOW DEVICES

Sanitary system.....	82.30 (3) (b)
Storm system.....	82.36 (4) (b)

CONTROLLED FLOW ROOF DRAIN SYSTEMS.....	82.36 (19)
---	------------

CORPORATION COCK

Definition.....	82.11 (53)
Required.....	82.40 (4)

CROSS CONNECTIONS

Definition.....	82.11 (55)
Control.....	82.41

CURB STOP

Definition.....	82.11 (56)
Required.....	82.41 (4)

D

DEAD ENDS.....	82.21 (2) (i)
DEFINITIONS.....	82.11
DETRIMENTAL WASTES.....	82.34 (3)
DEVELOPED LENGTH	
Definition.....	82.11 (59)
Between vent and trap.....	82.31 (9)
DISHWASHING MACHINES.....	82.33 (9) (d)
DISINFECTION OF POTABLE WATER SYSTEMS	82.40 (8) (i)
DRAINAGE FIXTURE UNITS—(SEE FIXTURE UNITS, DRAINAGE)	

E

EJECTORS	
Definition.....	82.11 (64)
Requirements.....	82.30 (10) (b)
ELEVATOR PIT SUBSOIL AND FLOOR DRAINS	82.33 (9) (f)
ENERGY CUTOFF DEVICES	82.40 (5) (d)

F

FITTINGS	
Minimum radius in drain system	82.30 (8)
Prohibited.....	82.30 (9) (c)
FIXTURE DRAIN CONNECTIONS	
Direct	82.32 (4), 82.32 (5)
Indirect.....	82.33
FIXTURE UNITS, DRAINAGE	
Definition.....	82.11 (69)
Values for continuous flow	82.30 (3) (b)
Values for intermittent flow	82.30 (3) (a)
FIXTURE UNITS, SUPPLY	
Definition.....	82.11 (70)
Assigned to various fixtures.....	82.40 (6)
FLOOD LEVEL RIM	
Definition.....	82.11 (72)
FLOOR DRAINS	
Required.....	82.30 (11) (a) 3.
FLOOR SINKS	
Definition.....	82.11 (73)
Requirements.....	82.33 (8) (b)
FOOD HANDLING ESTABLISHMENTS.....	82.33 (9) (g)
FREEZING, PROTECTION OF PIPES.....	82.40 (8) (a)
FROST PROTECTION, SEWERS.....	82.30 (11) (b) 2.
FUTURE FIXTURES	82.30 (4) (e)

G

GARAGE CATCH BASINS.....	82.34 (4)
GARBAGE CAN WASHERS.....	82.32 (5) (a)
GREASE INTERCEPTORS.....	82.34 (5)

H

HANGERS AND SUPPORTS	82.60
HEALTH CARE AND RELATED FACILITIES	82.50
HOT WATER	
Heaters and tanks	82.40 (5) (c)
Required	82.40 (3) (b)
Temperature maintenance	82.40 (5) (b)

I

INDIRECT WASTE PIPING	82.33
Boilers, pressure tanks and relief valves	82.33 (9) (a)
Clear water wastes	82.33 (9) (b)
Clothes washers	82.33 (9) (c)
Dishwashing machines	82.33 (9) (d)
Drips and drain outlets	82.33 (9) (e)
Elevator pit subsoil and floor drains	82.33 (9) (f)
Food handling establishments	82.33 (9) (g)
Receptors	82.33 (8)
Sterilizers	82.33 (9) (h)
Swimming pools	82.33 (9) (i)
Vacuum systems - central units	82.33 (9) (j)
INDIVIDUAL VENTS	82.31 (9)
INSPECTIONS	82.21 (1)
INSULATION, SEWERS	82.30 (11) (b)
INTERCEPTORS	82.34
Accessibility	82.34 (3) (f)
Automatic car washes	82.34 (6)
Bottling establishments	82.34 (9)
Chemical dilution and neutralizing basins	82.34 (14)
Commercial laundries	82.34 (7)
Dairy product processing plants	82.34 (10)
Garage catch basins	82.34 (4)
Grease interceptors	82.34 (5)
Meat processing plants and slaughterhouses	82.34 (11)
Oil and flammable liquids	82.34 (8)
Plaster and heavy solids	82.34 (13)
Sand	82.34 (12)
INTERCONNECTIONS	82.41

J

K

KITCHEN SINK DRAIN CONNECTIONS	82.32 (5) (b)
--------------------------------------	---------------

L

LAUNDRIES	
Commercial	82.33 (9) (c), 82.34 (7)
Self-service	82.33 (9) (c)
LOCAL VENT, INTERCEPTORS	82.34 (4) (a) 2.
LOCAL WASTES	82.33

M

MAIN STACK.....	82.31 (3) (b)
MAINTENANCE.....	82.21 (2)
MANHOLES.....	82.35

N

NONPOTABLE WATER	82.11 (102)
NOTIFICATION FOR INSPECTION	82.21 (1)

O

OFFSETS	
Definition.....	82.11 (106)
In drains	82.30 (6)
In vents	82.31 (15) (b)
OIL INTERCEPTORS	82.34 (8)

P

PIPING PROTECTION	
Backfilling.....	82.30 (11) (d)
Frost protection.....	82.30 (11) (b)
Trenching and bedding	82.30 (11) (d)
Wheel loading	82.30 (11) (d) 4.
PITCH	
Drain piping	82.30 (5)
Vent piping	82.31 (15), 82.31 (12) (c)
PLAN REVIEW AND APPROVAL	82.20
PRIVATE INTECEPTOR MAIN SEWERS	
Definition.....	82.11 (118)
Installation	82.30 (12)
Sizing.....	82.30 (4) (d)
Conformance to areawide water quality management plan	82.20 (4) (c) 2.
PUMPS	
Sewage.....	82.30 (10)
Storm and clear water	82.36 (11)

Q

R

RADII OF DRAIN FITTINGS.....	82.30 (8)
REDUCED PRESSURE PRINCIPLE-TYPE BACK-FLOW PREVENTER	
Definition.....	82.11 (126)
Annual testing	82.21 (2) (a)
RELIEF VENTS	
Building drain.....	82.31 (7)
Circuit vented horizontal drain	82.31 (10) (b)
Drain stack offset.....	82.30 (6) (b), 82.31 (5)

Sizing	82.31 (14) (g)
Wet vented horizontal drain	82.31 (13) (b)
ROOF DRAINS	82.36 (18), 82.36 (19)

S

SAND INTERCEPTOR	82.34 (12)
SANITARY DRAIN SYSTEM	82.30
SLAUGHTERHOUSES	82.34 (11)
SMOKE TEST	82.21 (1) (d)
STORM AND CLEAR WATER DRAIN SYSTEMS	82.36
SUMPS	
Sanitary	82.30 (10)
Storm	82.36 (11)
SWIMMING POOLS	82.33 (9) (i)

T

TEMPERATURE OF WASTE	82.33 (9) (a)
TESTING AND MAINTNANCE	82.21 (2)
TRAPS	82.32
Required	82.32 (3)
Prohibited types	82.32 (3) (f)
TRENCHING, EXCAVATION, BACKFILL	82.30 (11) (d)

U

UNDERGROUND DRAIN PIPING	
Minimum size	82.30 (4) (b)
USED PIPING MATERIAL AND FIXTURES	82.21 (2) (e)

V

VACUUM BREAKERS	82.41
VALVES	
Backwater	82.30 (11) (a) 2.
Pressure reducing	82.40 (7) (d) 2.
Relief	82.40 (5) (d)
Safety	82.40 (5) (d)
Control, water	82.40 (4)
VELOCITY	
Drain lines	82.30 (5)
Water lines	82.40 (7) (e)
VENT STACK	
Definition	82.11 (169)
Required	82.31 (4)
VENTS AND VENTING SYSTEMS	82.31
Circuit	82.31 (10)
Combination drain and vent	82.31 (17)
Common	82.31 (17)
Developed length between vent and trap	82.31 (9)
Individual	82.31 (9)

Island fixtures	82.31 (12)
Laboratory sink	82.31 (17) (c)
Main stack required	82.31 (3) (b)
Relief	82.30 (6) (b), 82.31 (5), 82.31 (7), 82.31 (10) (b)
Sizing	82.31 (14)
Stack vents required	82.31 (13)
Vent grades and connections	82.31 (15)
Vent stack required	82.31 (4)
Vent terminals	82.31 (16)
Wet vent	82.31 (13)
Yoke	82.30 (6) (b), 82.31 (5), 82.31 (6)

W

WASTE WATER TEMPERATURE	82.33 (9) (a)
WATER SUPPLY SYSTEMS	82.40
Control valves	82.40 (4)
Relief valves	82.40 (5) (d)
Sizing	82.40 (7)
WATER TEST	82.21 (1) (d)
WET VENTING	82.31 (13)

Y

YOKE VENTS

Definition	82.11 (186)
Required	82.30 (6) (b), 82.31 (5), 82.31 (6)
Size	82.31 (14) (h)

Chapter ILHR 84

PLUMBING PRODUCTS

ILHR 84.01	Scope (p. 377)	ILHR 84.14	Health care and laboratory plumbing appliances (p. 380)
ILHR 84.02	Penalties (p. 377)	ILHR 84.20	Plumbing fixtures, appliances and equipment (p. 380)
ILHR 84.03	Definitions (p. 377)	ILHR 84.30	Plumbing materials (p. 387)
ILHR 84.10	Department approval (p. 377)	ILHR 84.40	Joints and connections (p. 396)
ILHR 84.11	Identification (p. 379)	ILHR 84.50	Alternate approvals and experimental approvals (p. 403)
ILHR 84.12	Penetrations of fire-resistive assemblies (p. 379)	ILHR 84.60	Incorporation of standards by reference (p. 405)
ILHR 84.13	Chemical or biochemical treatments for private sewage systems (p. 380)		

Note: Chapter ILHR 84 as it existed on May 31, 1988 was repealed and a new chapter ILHR 84 was created effective June 1, 1988.

ILHR 84.01 Scope. The provisions of this chapter govern the quality and installation of materials, fixtures, appliances, appurtenances, and equipment relating to plumbing.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.02 Penalties. Penalties for violations of this chapter shall be assessed in accordance with ss. 145.12 and 145.25, Stats.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.03 Definitions. In this chapter:

(1) "Health care plumbing appliance" means a plumbing appliance, the function of which is unique to health care activities.

(2) "Laboratory plumbing appliance" means a plumbing appliance, the function of which is unique to scientific experimentation or research activities.

(3) "Prefabricated plumbing" means concealed drain piping, vent piping or water supply piping or a combination of these types of piping, contained in a modular building component, which will not be visible for inspection when delivered to the final site of installation.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.10 Department approval. No fixture, appliance, appurtenance, material, device or product may be sold for use in a plumbing system or may be installed in a plumbing system, unless it is of a type conforming to the standards or specifications of chs. ILHR 82 and 83 and this chapter and ch. 145, Stats.

(1) If it is alleged that the approval of a fixture, appliance, appurtenance, material, device or product under this section would result in an adverse health effect or potentially adverse health effect on the waters of the state, the department may require an alternate or experimental product approval under s. ILHR 84.50.

(2) **PRODUCT REVIEW AND APPROVAL.** Each type of plumbing product which falls into one of the categories specified in Table 84.10 shall be approved by the department in accordance with this subsection before

Register, May, 1988, No. 389

the product may be sold for use in a plumbing system or installed in a plumbing system.

(a) Except as provided in subds. 1 and 2, specifications and plans or drawings for each type of product shall be submitted to the department for review. The submittal shall be accompanied by sufficient data and information to determine if the product and its performance complies with the provisions of chs. ILHR 82, 83 and this chapter and ch. 145, Stats.

1. The submitter of a cross-connection control device listed under Table 84.10, line 2 may submit in lieu of specifications, plans or drawings evidence that the product is currently listed by a nationally recognized evaluation agency acceptable to the department. Evidence substantiating the listing by an evaluation agency shall include a research report from which it can be determined that the product conforms to the appropriate requirements of s. ILHR 84.30 (5) (c).

2. The submitter of a water-conserving type of product listed under Table 84.10, line 7 may submit in lieu of specifications, plans or drawings evidence that the product is currently listed by a nationally recognized evaluation agency acceptable to the department. Evidence substantiating the listing by an evaluation agency shall include a research report from which it can be determined that the product conforms to the requirements of s. ILHR 84.20.

(b) The department may require that a submitter of a product for review have the product tested and its performance certified by an approved testing laboratory.

(c) If, upon review, the department determines that a product conforms to the provisions of chs. ILHR 82, 83 and this chapter and ch. 145, Stats., the department shall issue an approval in writing. The department may impose specific conditions in granting an approval. Violations of the conditions under which an approval is granted shall constitute a violation of this chapter.

(d) If, upon review, the department determines that a product does not conform to provisions of chs. ILHR 82, 83 and this chapter and ch. 145, Stats., the request for approval shall be denied in writing.

(e) The department shall review and make a determination on an application for a product approval within 40 business days of receipt of all fees, plans, drawings, specifications and other information required to complete the review.

(f) If an approved plumbing product is modified or additional assertions of function or performance are made, the approval shall be considered null and void, unless the change is submitted to the department for review and the approval is reaffirmed.

(g) Approvals for plumbing products issued by the department prior to November 1, 1985, shall expire 30 months after the effective date of this section.

(h) Approvals for plumbing products issued by the department after November 1, 1985, shall expire at the end of the 60th month after the date of approval issuance.

Table 84.10
SUBMITTALS TO DEPARTMENT

Product Categories

1. Chemical or biochemical treatments for private sewage systems
 2. Cross-connection control devices
 3. Health care plumbing appliances
 4. Laboratory plumbing appliances
 5. Prefabricated septic/holding tanks
 6. Prefabricated plumbing
 7. Water-conserving faucets, spouts and plumbing fixtures: *
 - a. Kitchen sink faucets for use in dwelling units and living units.
 - b. Lavatory faucets
 - c. Shower heads
 - d. Urinals
 - e. Urinal flushing devices
 - f. Water closets
 - g. Water closet flushing devices
 8. Water treatment devices
-

*See s. 145.25, Stats., and s. ILHR 84.20 (3) concerning water conserving fixtures.

(3) **PRODUCT LISTING.** The department may list, upon request, plumbing products which conform to the standards or specifications referenced in ch. ILHR 82, 83 or this chapter, but which do not require approval under sub. (2). Each request for listing shall be made on a form provided by the department.

Note: Request for product listing is to be made on form SBD 7557 which may be obtained from Safety and Buildings Division, P.O. Box 7969, Madison, Wisconsin 53707.

(4) **REVOCATION.** The department may revoke any approval or listing issued under this section for any false statements or misrepresentation of facts or data on which the approval or listing was based, or as a result of the product's failure, or if future information indicates a potential health hazard or potential threat to the waters of the state.

(5) **LIMITATIONS.** An approval or listing of a plumbing product by the department may not be construed as an assumption of any responsibility for defects in design, construction or performance of any product nor for any damages that may result.

(6) **FEES.** Fees for product approval review and product listing shall be submitted in accordance with s. Ind 69.23.

Note: See Appendix for further explanatory material.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.11 Identification. Each length of pipe and each pipe fitting, trap, fixture, material, device and product to be used in plumbing shall be marked as required by the applicable standard specified by reference in this chapter or as specified in s. ILHR 83.15 for septic tanks and holding tanks, and s. ILHR 84.20 (5) (o) for water treatment devices.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.12 Penetrations of fire-resistive assemblies. Penetrations of fire-resistive assemblies, such as walls and floor-ceiling systems, by plumbing systems or plumbing materials shall be protected in accordance with requirements of chs. ILHR 50 to 64.

Register, May, 1988, No. 389

ILHR 84

Note: See Appendix for further explanatory material.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.13 Chemical or biochemical treatments for private sewage systems. Chemical or biochemical treatments for private sewage systems shall function and perform in accordance with the assertions submitted to the department. Chemical or biochemical treatments for private sewage systems may not directly or indirectly adversely affect bacterial action in the systems, soil hydraulic conductivity in the absorption areas, or groundwater quality beneath the systems.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.14 Health care and laboratory plumbing appliances. Health care plumbing appliances and laboratory plumbing appliances shall function and perform in accordance with the drain, vent, water supply and backflow protection requirements of ch. ILHR 82.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.20 Plumbing fixtures, appliances and equipment. (1) **DESIGN AND CONSTRUCTION.** All plumbing fixtures, appliances and equipment shall be designed and constructed to:

- (a) Ensure durability, proper service and sanitation;
- (b) Be free from defects;
- (c) Be free from concealed fouling surfaces;
- (d) Not require undue efforts in cleaning and operating; and
- (e) Prevent nonpotable liquids, solids or gasses from being introduced into a potable water supply system through cross-connections.

(2) **MATERIALS.** Plumbing fixtures shall have smooth surfaces which are impervious to water.

(3) **WATER CONSERVING FAUCETS, SPOUTS AND PLUMBING FIXTURES.** Water conserving faucets, spouts and plumbing fixtures which meet or exceed the water conservation requirements established in par. (b) shall be installed as specified in par. (a).

(a) 1. All lavatory faucets, shower heads, urinals, urinal flushing devices, water closets and water closet flushing devices shall conform to par. (b).

2. All faucets installed on kitchen sinks of dwelling units and living units shall conform to par. (b) 4.

3. All lavatory faucets installed in public restrooms shall be of a self-closing type.

(b) 1. General. Flow control or flow restricting devices shall be installed on the water inlet side or shall be an integral part of the faucet, spout or fixture. A flow controlling or restricting aerator shall be considered to be an integral part of a faucet or spout.

2. Lavatory faucet. a. The maximum discharge rate of lavatory faucets shall be 3 U.S. gallons per minute at an 80 psig flowing supply pressure.

Register, May, 1988, No. 389

b. Lavatory faucets which are of the self-closing type shall allow a maximum of one U.S. gallon to flow through the faucet after the handle or actuator is released.

3. Shower heads. The maximum discharge rate of shower heads shall be 3 U.S. gallons per minute at an 80 psig flowing supply pressure.

4. Sink faucets. The maximum discharge rate of sink faucets shall be 3 U.S. gallons per minute at an 80 psig flowing supply pressure.

5. Urinals. Urinals shall function properly with a maximum of 1.5 U.S. gallons per flush per fixture use at static test pressures of 20 psig and 80 psig.

6. Urinal flushing devices. The flushing cycle for urinal flushing devices shall discharge a maximum of 1.5 U.S. gallons per flush per fixture use at static test pressures of 20 psig and 80 psig.

7. Water closets. Water closets shall function properly with a maximum of 4 U.S. gallons per flush over the range of static test pressures specified in Table 84.20.

8. Water closet flushing devices. The flushing cycle for water closet flushing devices shall discharge a maximum of 4 U.S. gallons over the range of static test pressures specified in Table 84.20.

Table 84.20
STATIC TEST PRESSURES FOR WATER CLOSETS
AND WATER CLOSET FLUSHING DEVICES

Tank Type	Flushometer Type	
	Siphonic	Blow Out
20 to 80 psig	25 to 80 psig	35 to 80 psig

(4) GENERAL REQUIREMENTS. (a) *Fixture outlets*. 1. The outlet passage-way of a fixture shall be free from impairments and of sufficient size to insure proper discharge of the fixture contents under normal conditions.

2. The outlet connection of a fixture which directly connects to the drain system shall be an air and watertight joint.

(b) *Installation of fixtures*. 1. Access for cleaning. Plumbing fixtures shall be so installed as to afford easy access for cleaning both the fixture and the area around it.

2. Securing wall mounted fixtures. Wall mounted fixtures shall be rigidly supported by a hanger which is attached to structural members so that the load is not transmitted to the fixture drain connection or any other part of the plumbing system. The hanger for a wall mounted water closet shall conform to ANSI A112.6.1M.

3. Water supply protection. The water supply pipes and fittings within every plumbing fixture shall be so installed as to prevent backflow.

4. Design of overflow. A fixture which is provided with an overflow outlet shall be designed and installed so that standing water in the fixture cannot rise in the overflow when the fixture's stopper is closed, and so that no water remains in the overflow when the fixture is empty.

5. Connection of overflows. The overflow from any fixture shall discharge into the drain system on the inlet or fixture side of the trap.

6. Overflows in flush tanks. Flush tanks shall be provided with overflows discharging to the fixture served and shall be of sufficient size to prevent flooding the tank at the maximum rate at which the tanks are supplied with water.

7. Strainers. All plumbing fixtures other than water closets, clinic sinks, trap standard service sinks with flush rims, urinals, standpipes and waste sinks shall be provided with strainers, cross bars or pop-up stoppers which restrict the clear opening of the waste outlet.

8. Flushometer valves. Flushometer valves shall be equipped with vacuum breakers which conform to ASSE 1001. Flushometer valves may not be used where the water pressure is insufficient to properly operate them. When the valve is operated, it shall complete the cycle of operation automatically, opening fully and closing positively under the water supply pressure. Each flushometer shall be provided with a means for regulating the flow through it.

9. Safing. The floors of all shower stalls, shower rooms, floor setting service sinks or receptors, sunken bathtubs or other similar fixtures shall be protected with a safing material installed beneath the finish floor of the entire fixture or room and upward along the sides to a minimum of 6 inches above the curb or maximum water level of the fixture. Safing materials shall conform to s. ILHR 84.30 (6). The corners of the fixture or room shall be safed to a height of 6 feet and at least 3 inches in each direction from the corners. The safing material shall be properly drained. Prefabricated fixtures and installations directly over an unexcavated portion of a building are exempt from safing requirements.

Note: Chapters ILHR 50 to 64 contain provisions for toilet rooms and sanitary facilities, for public buildings and places of employment concerning toilet facilities for the handicapped, fixture compartments, number of fixtures for the different types of occupancies and toilet room finishes.

Note: See Appendix for further explanatory material.

(5) PLUMBING FIXTURES AND PLUMBING APPLIANCES. (a) *Automatic clothes washers*. Residential type automatic clothes washers shall conform to ASSE 1007.

(b) *Bathtubs*. 1. a. Enameled cast iron bathtubs shall conform to ANSI A112.19.1M.

b. Porcelain enameled formed steel bathtubs shall conform to ANSI A112.19.4.

c. Plastic bathtubs shall conform to ANSI Z124.1.

2. Bathtubs shall have waste outlets and overflows at least 1-1/2 inches in diameter. A pop-up stopper or other closing device shall be provided on the waste outlet.

3. All whirlpool piping for bathtubs shall drain by gravity to the trap serving the bathtub.

4. All waterways of the whirlpool pump for a bathtub shall drain by gravity to the trap serving the bathtub.

(c) *Bidets*. Vitreous china bidets shall conform to the material requirements in ANSI A112.19.2M.

1. A bidet may not be located closer than 15 inches from its center to any side wall, partition, vanity or other obstruction, nor closer than 30 inches center to center from a water closet.

2. Bidets with submerged inlet fittings shall be protected by vacuum breakers which conform to ASSE 1001.

(d) *Dishwashing machines*. 1. Residential type dishwashing machines shall conform to ASSE 1006.

2. Commercial type dishwashing machines shall conform to ASSE 1004.

(e) *Drinking fountains*. 1. Drinking fountains and water coolers shall conform to ARI 1010 or ANSI A112.19.2M.

2. Drinking fountains may not be installed in toilet rooms.

3. The water supply for drinking fountains shall be provided with an adjustable valve fitted with a loose key or an automatic self-closing valve permitting regulation of the rate of flow of water. The water supply issuing from the nozzle shall be of sufficient volume and height so that persons using the fountain need not come in direct contact with the nozzle or orifice.

4. A drinking fountain may not have a waste outlet less than 1-1/4 inches in diameter.

(f) *Floor drains*. 1. Floor drains shall be provided with removable strainers of sufficient strength to carry the anticipated loads.

2. The floor drain shall be so constructed that it can be cleaned, and the drain inlet shall be accessible at all times.

3. Floor drains shall be of a size to efficiently serve the intended purpose. The floor drain outlet shall not be less than 2 inches in diameter.

(g) *Food waste grinders*. 1. Residential type food waste grinders shall conform to ASSE 1008. Commercial type food waste grinders shall conform to ASSE 1009.

2. Food waste grinders shall be connected to a drain of sufficient size to serve the unit, but not less than 1-1/2 inches in diameter.

3. Food waste grinders shall be connected to a drain and trapped separately from any other fixtures or sink compartments.

4. All food waste grinders shall be provided with an adequate supply of cold water at a sufficient flow rate to insure proper functioning of the unit.

(h) *Laundry trays*. Each compartment of a laundry tray shall be provided with a waste outlet not less than 1-1/2 inches in diameter.

(i) *Lavatories*. 1. a. Enameled cast iron lavatories shall conform to ANSI A112.19.1M.

b. Vitreous china lavatories shall conform to ANSI A112.19.2M.

- c. Stainless steel lavatories shall conform to ANSI A112.19.3.
 - d. Porcelain enameled formed steel lavatories shall conform to ANSI A112.19.4.
 - e. Plastic lavatories shall conform to ANSI Z124.3.
2. Cultured marble vanity tops with an integral lavatory shall conform to ANSI Z124.3.
3. Lavatories shall have waste outlets not less than 1-1/4 inches in diameter.
- (j) *Showers*. 1. Prefabricated plastic showers and shower compartments shall conform to ANSI Z124.2.
2. Water distribution piping from the shower valve to the shower head outlet shall be securely attached to the structure.
3. Except for combination bathtub-shower units, waste outlets serving showers shall be at least 2 inches in diameter and shall have removable strainers of sufficient strength for the anticipated loads.
4. Where a waste outlet serves more than one shower space or shower head, the waste outlet shall be at least 2 inches in diameter and the waste outlet shall be so located and the floor so pitched that waste water from one shower does not flow over the floor area serving another shower.
5. All shower compartments, regardless of shape, shall have a minimum finished interior of 900 square inches and shall be capable of encompassing a circle with a diameter of 30 inches. The minimum required area and dimension shall be measured in a horizontal plane 24 inches above the top of the threshold and may not extend beyond the centerline of the threshold. The minimum area and dimensions shall be maintained to a point 70 inches above the shower waste outlet with no protrusions other than the fixture valve or valves, showerheads, soap dishes and safety grab bars or rails.

Note: See Appendix for further explanatory materials.

- (k) *Sinks*. 1. a. Enameled cast iron sinks shall conform to ANSI A112.19.1M.
- b. Vitreous china sinks shall conform to ANSI A112.19.2M.
 - c. Stainless steel sinks shall conform to ANSI A112.19.3.
 - d. Porcelain enameled formed steel sinks shall conform to ANSI A112.19.4.
2. Sinks shall be provided with waste outlets not less than 1½ inches in diameter. Sinks on which a food grinder is installed shall have a waste opening not less than 3¼ inches in diameter.
- (l) *Urinals*. 1. Vitreous china urinals shall conform to ANSI A112.19.2M.

2. A urinal may not be located closer than 16 inches from its center to any side wall, partition, vanity or other obstruction, nor closer than 30 inches center to center, between urinals. When the space between stall type urinals or a stall type urinal and a side wall is less than 12 inches, the

space shall be filled flush with the front and top of the urinal with nonabsorbent material.

Note: See Appendix for further explanatory material.

3. Stall type urinals shall be set into the floor and the floor shall be pitched toward the fixture.

4. Automatic siphon urinal flush tanks may not be installed.

(m) *Water closets.* 1. a. Vitreous china water closets shall conform to ANSI A112.19.2M.

b. Plastic water closets shall conform to ANSI Z124.4.

2. Water closets in public buildings and places of employment shall have elongated bowls and hinged, open front seats without covers.

3. Water closets in individual living units, day care centers, individual executive offices, and sleeping units of hotels and motels may be of the round bowl type, provided with hinged, closed front seat, with or without a cover.

4. In nurseries, schools and other similar places where plumbing fixtures are provided for the use of children under six years of age, water closets may be of a size and height suitable for the children's use.

5. All water closet seats shall be of smooth nonabsorbent material.

6. Each water closet shall be individually equipped with a flushing device. All flushing devices shall be readily accessible for maintenance and repair. Ballcocks and fill valves shall be of the anti-siphon type and shall conform to ASSE 1002. The critical level mark on the ballcock and fill valve shall be located at least one inch above the full opening of the overflow pipe.

7. A water closet may not be located closer than 15 inches from its center to any side wall, partition, vanity, or other obstruction, nor closer than 30 inches center to center, between water closets. There shall be at least 24 inches clearance in front of a water closet to any wall, fixture or door.

Note: See Appendix for further explanatory material.

8. No person may install or maintain pan, plunger, offset washout, washout, long hopper, frostproof and other types of water closets having invisible seals or unventilated spaces or walls not thoroughly cleansed at each flushing.

(n) *Water heaters.* 1. Listed equipment. All water heaters shall bear the label of a listing agency approved by the department. Listing agencies approved by the department shall include:

- a. Underwriters Laboratories, Inc.;
- b. American Gas Association; and
- c. American Society of Mechanical Engineers.

2. Design. a. All pressurized water heaters and pressurized hot water storage tanks, except those bearing the label of the American Society of Mechanical Engineers, shall be designed and constructed to withstand a

minimum test pressure of 150% of the maximum allowable working pressure of the heater or tank.

b. All pressurized water heaters and pressurized hot water storage tanks shall be rated for a minimum working pressure of 125 psig.

c. A drain valve shall be installed at the lowest point of each water heater and hot water storage tank. Drain valves shall conform to ASSE 1005.

3. Safety devices. a. Relief valves shall be listed by the American Gas Association, Underwriters Laboratories, Inc. or American Society of Mechanical Engineers when the heat input to a water heater is less than or equal to 200,000 Btu per hour.

b. Relief valves shall be listed by the American Society of Mechanical Engineers when the heat input to a water heater exceeds 200,000 Btu per hour.

c. Pressure relief valves shall be set to open at either the maximum allowable working pressure rating of the water heater or storage tank or 150 psig, whichever is smaller.

d. Temperature and pressure relief valves shall be set to open at a maximum of 210°F and in accordance with subpar. c.

4. Hot water dispensers. Nonpressurized point-of-use water heaters shall conform to ASSE 1023.

(o) *Water treatment devices.* 1. Water softeners shall conform to WQA S-100.

2. a. Except as provided in subpar. b., water treatment devices shall function and perform in accordance with the assertions submitted to the department under s. ILHR 84.10, relating to rendering inactive or removing contaminants.

b. A water treatment device which injects a water treatment compound into a water supply system shall maintain the compound concentration in the system over the working flow rate range and pressure range of the device.

3. Except as specified in subd. 4., water treatment compounds introduced into the water supply system by a water treatment device shall be listed as an acceptable drinking water additive by a listing agency approved by the department. Listing agencies approved by the department shall include:

- a. United States Environmental Protection Agency;
- b. United States Food and Drug Administration; and
- c. National Sanitation Foundation.

4. A water supply system shall be protected from backflow when unlisted water treatment compounds, which may affect the potability of the water, are introduced into the system. The department shall determine the method of backflow protection. Water supply outlets for human use or consumption may not be installed downstream of the introduction of an unlisted water treatment compound.

5. Water treatment devices designed for contaminated water supplies shall be labeled to identify the following information:

- a. The name of the manufacturer of the device;
- b. The device's trade name; and
- c. The device's model number.

(p) *Other plumbing fixtures, appliances and equipment.* Plumbing fixtures, appliances and equipment not specifically covered in this subsection shall conform to the applicable performance standards of this chapter and chs. ILHR 82 and 83.

(6) FAUCETS, SPOUTS AND FIXTURE SUPPLY CONNECTORS. (a) Except for circular and semi-circular wash fountains, all faucets and showerheads shall conform to ANSI A112.18.1M.

(b) Circular and semi-circular wash fountains shall conform to the working pressure, burst pressure, discharge rate and product marking requirements of ANSI A112.18.1M.

(c) All fixture supply connectors shall be designed and constructed to withstand a minimum pressure of 100 psig at 180°F.

(d) Flexible hose and spray assemblies for residential sinks shall conform to ASSE 1025.

(e) Hand held showers shall conform to ASSE 1014.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.30 Plumbing materials. (1) **GENERAL.** When selecting the material and size for a plumbing system, due consideration shall be given to the soil, liquid, and atmospheric environments that will eventually surround the plumbing system.

(a) The bending or offsetting of flexible or annealed pipe or tubing shall be in accordance with the applicable material standard or the instructions of the manufacturer of the pipe or tubing.

(b) Pipe or tubing with gouges, cuts or deep scratches may not be installed.

(c) Pipe or tubing which has been kinked may not be installed.

(d) The bending or offsetting of rigid pipe shall be prohibited.

(e) Nailing plates shall be installed to protect copper or plastic pipe or tubing from puncture.

Note: See s. ILHR 84.30 (4) (f) concerning the bending of polybutylene water distribution pipe and tubing.

(2) **SANITARY DRAIN AND VENT SYSTEMS.** Sanitary drain systems and vent systems shall be of such material and workmanship as set forth in this subsection.

(a) *Above ground drain and vent pipe.* Except as provided in s. ILHR 82.33 (2), drain pipe and vent pipe installed above ground shall conform to one of the standards listed in Table 84.30-1.

(b) *Underground drain and vent pipe.* Except as provided in par. (d), drain pipe and vent pipe installed underground shall conform to one of the standards listed in Table 84.30-2.

(c) *Sanitary building sewer pipe.* Except as provided in s. ILHR 83.15 (4) (e), sanitary building sewer pipe shall conform to one of the standards listed in Table 84.30-3.

(d) *Effluent piping.* 1. Except as provided in s. ILHR 83.15 (4) (e), non-perforated drain piping conveying effluent from a septic tank to the distribution piping of a nonpressurized soil absorption system shall conform to one of the standards listed in Table 84.30-3.

2. Perforated drain piping distributing septic tank effluent in a nonpressurized soil absorption system shall conform to one of the standards listed in Table 84.30-4.

3. Except as provided in s. ILHR 83.15 (4) (e), nonperforated drain piping conveying effluent from a septic tank to the distribution piping of a pressurized soil absorption system shall conform to one of the standards listed in Table 84.30-5 or as otherwise approved by the department.

4. Drain piping distributing septic tank effluent in a pressurized soil absorption system shall conform to one of the standards listed in Table 84.30-5 and shall be perforated in accordance with s. ILHR 83.14 (3) (c).

(e) *Chemical drain and vent pipe.* Drain systems and vent systems for chemical wastes shall be of approved corrosion resistant material. The manufacturer of the pipe shall indicate to the department the material's suitability for the concentrations of chemicals involved.

(f) *Catch basins, interceptors and sumps.* Catch basins, interceptors and sumps shall be constructed in a watertight manner of precast reinforced concrete, reinforced monolithic concrete, cast iron, coated 12-gauge steel, vitrified clay, fiberglass, plastic or other approved materials.

(g) *Manholes.* Manholes shall be constructed in a watertight manner of precast reinforced concrete, reinforced monolithic concrete, brick or block, fiberglass or other approved materials. Fiberglass manholes may be approved for use in traffic areas if the top section of the manhole is not made of fiberglass.

Table 84.30-1
ABOVE GROUND DRAIN AND VENT PIPE AND TUBING

Material	Standard
Acrylonitrile butadiene styrene (ABS)	ASTM D1527; ASTM D2661; ASTM F628
Brass	ASTM B43
Cast iron	ASTM A74; CISPI 301
Copper	ASTM B42; ASTM B88; ASTM B306
Galvanized steel	ASTM A53; ASTM A120
Lead	FS-WW-P-325B
Polyvinyl chloride (PVC)	ASTM D2665; ASTM D1785
Synthetic rubber hose ^a	AHAM DW-1

Note a: The installation of synthetic rubber hose is limited in use to indirect waste piping or local waste piping from dishwashers in accordance with s. ILHR 82.33 (9) (d).

Table 84.30-2
UNDERGROUND DRAIN AND VENT PIPE AND TUBING

Material	Standard
Acrylonitrile butadiene styrene (ABS)	ASTM D1527; ASTM D2661; ASTM F628
Cast iron	ASTM A74; CISPI 301
Concrete	ASTM C14; ASTM C76
Copper ^a	ASTM B42; ASTM B88
Polyvinyl chloride (PVC)	ASTM D2665; ASTM D1785
Vitrified clay	ASTM C700

Note a: Copper tubing, type M, may not be installed underground.

Table 84.30-3
SANITARY BUILDING SEWER PIPE AND TUBING

Material	Standard
Acrylonitrile butadiene styrene (ABS) ^a	ASTM D1527; ASTM D2661; ASTM D2751; ASTM F628
Acrylonitrile butadiene styrene (ABS) composite	ASTM D2680
Cast iron	ASTM A74; CISPI 301
Concrete	ASTM C14; ASTM C76
Copper ^b	ASTM B42; ASTM B88
Polyvinyl chloride (PVC) ^a	ASTM D2665; ASTM D3033; ASTM D3034 ASTM D1785
Vitrified clay	ASTM C700

Note a: Thermoplastic sewer pipe shall be installed in accordance with ASTM D2321.

Note b: Copper tubing, type M, may not be installed underground.

Table 84.30-4
PERFORATED
EFFLUENT DISTRIBUTION PIPING FOR
NONPRESSURIZED SOIL ABSORPTION SYSTEMS

Material	Standard
Polyethylene (PE)	ASTM F405; ASTM F810
Polyvinyl chloride (PVC)	ASTM D2729
Styrene rubber (SR)	ASTM D3298

Table 84.30-5
EFFLUENT DISTRIBUTION PIPING FOR
PRESSURIZED SOIL ABSORPTION SYSTEMS

Material	Standard
Acrylonitrile butadiene styrene (ABS)- Schedule 40	ASTM D2661; ASTM D1527
Polyvinyl chloride (PVC)- Schedule 40	ASTM D2665; ASTM D1785

(3) **STORM AND CLEAR WATER DRAIN AND VENT SYSTEMS.** Storm and clear water drain and vent systems shall be of such material and workmanship as set forth in this subsection.

(a) *Above ground drain and vent pipe.* Drain pipe and vent pipe installed above ground and inside a building shall conform to one of the standards listed in Table 84.30-1, except black steel pipe conforming to

ASTM A53 or ASTM A120 may be used for storm water conductors. Black steel conductors may not be embedded in concrete or masonry.

(b) *Underground drain and vent pipe.* Drain pipe and vent pipe installed underground shall conform to one of the standards listed in Table 84.30-2.

(c) *Storm building sewer pipe.* Storm building sewer pipe shall conform to one of the standards listed in Table 84.30-6.

(d) *Subsoil drain pipe.* Subsoil drains shall be open jointed, horizontally split, or perforated pipe conforming to one of the standards listed in Table 84.30-7.

(e) *Roof drains.* 1. Roof drains shall be provided with removable strainers of sufficient strength to carry the anticipated loads.

2. Roof drains shall be so constructed that the drains can be cleaned and the drain inlets accessible at all time.

3. Roof drains shall be sized in accordance with s. ILHR 82.36 and the drain outlet shall not be less than 2½ inches in diameter.

Note: See s. ILHR 82.36 (18) for additional roof drain requirements.

(f) *Area drain inlets.* Area drain inlets shall be constructed in a water-tight manner of precast concrete, reinforced monolithic concrete, brick or block, cast iron, coated 12 gauge steel, vitrified clay, fiberglass or other approved materials.

Table 84.30-6
STORM BUILDING SEWER PIPE AND TUBING

Material	Standard
Acrylonitrile butadiene styrene (ABS) ^a	ASTM D1527; ASTM D2661; ASTM D2751; ASTM F628
Acrylonitrile butadiene styrene (ABS) composite	ASTM D2680
Cast iron	ASTM A74; CISPI 301
Concrete	ASTM C14; ASTM C76
Copper ^b	ASTM B42; ASTM B88
Corrugated steel ^c	FS-WW-P-405a
Polyvinyl chloride (PVC) ^a	ASTM D2665; ASTM D3033; ASTM D3034; ASTM D1785
Vitrified clay	ASTM C700

Note a: Thermoplastic sewer pipe shall be installed in accordance with ASTM D2321.

Note b: Copper tubing, type M, may not be installed underground.

Note c: Corrugated steel pipe may be used for storm building sewers subject to the following conditions:

1. The pipe shall be sized according to ch. ILHR 82 with adjustments considered to allow for flow characteristics and configuration of the pipe; and

2. The pipe may not be installed closer than 10 feet from a building's exterior wall or foundation.

TABLE 84.30-7
SUBSOIL DRAIN PIPE AND TUBING

Material	Standard
Cast iron	ASTM A74; CISPI 301
Clay drain tile	ASTM C4
Polyethylene (PE)	ASTM F405
Polyvinyl chloride (PVC)	ASTM D2729 (Perforated only)
Styrene rubber (SR)	ASTM D3298
Vitrified clay	ASTM C700

(4) **WATER SUPPLY SYSTEMS.** Water supply systems shall be of such material and workmanship as set forth in this subsection. All materials in contact with water, in a water supply system, shall be suitable for use with potable water.

(a) *Water quality.* A water supply system shall be resistive to corrosive action and degrading action from the water being conveyed.

(b) *Soil and groundwater.* The installation of water supply systems shall be prohibited in soil and groundwater that is contaminated with solvents, fuels, organic compounds or other detrimental materials which will cause permeation, corrosion, degradation, or structural failure of the piping material.

1. Where detrimental conditions are suspected, a chemical analysis of the soil and groundwater conditions shall be required to ascertain the acceptability of the proposed water supply system materials for the specific installation.

2. Where a detrimental condition exists, no underground water supply system may be installed until the detrimental condition can be:

- a. Eliminated and the source of the condition can be eliminated;
- b. Identified and the pipe and joining method can be proven resistant to the detrimental condition; or
- c. Avoided by choosing an alternate route that will not be affected by the detrimental condition.

(c) *Certification of plastic pipe.* Plastic pipe for a water supply system shall conform to NSF 14 and shall be certified by a nationally recognized testing agency as to conforming to NSF 14. Plastic pipe for water supply systems shall bear the certification mark of the testing agency.

(d) *Water services and private water mains.* 1. Water service pipe and private water mains shall conform to one of the standards listed in Table 84.30-8. Pipe and tubing for water services and private water mains shall have a minimum working pressure of 150 psig at 73.4°F.

2. A local governmental unit may by ordinance restrict the types of materials for water services and private water mains which are to be located within or beneath an area subject to an easement for a highway, street or public service right-of-way. Before adopting an ordinance restricting the types of materials for water services the local governmental unit shall submit a copy of the proposed ordinance to the department for review and approval.

3. Existing metallic water service piping or water distribution piping used for electrical grounding shall not be replaced with nonmetallic pipe or tubing until other approved electrical grounding means are provided.

(e) *Water distribution pipe.* 1. Except as provided in subd. 2., water distribution pipe shall have a minimum working pressure of 100 psig at 180°F and shall conform to one of the standards listed in Table 84.30-9.

2. Water distribution pipe installed underground for an exterior turf sprinkler system shall conform to one of the standards listed in Table 84.30-10. Water distribution pipe and fittings for exterior turf sprinkler systems shall have a minimum working pressure of 100 psig at 73.4°F. Water distribution pipe installed above ground for an exterior turf sprinkler system shall conform to subd. 1.

Note: Portions of a water supply system that supply water to a fire sprinkler system are to also conform to the requirements specified in s. ILHR 51.23.

(f) *Bending limitations.* 1. The bending of polybutylene water service pipe or tubing shall be in accordance with the manufacturer's instructions.

2. a. The bending radius of polybutylene water distribution pipe or tubing shall meet or exceed the bending radius specified in Table 84.30-9m and shall meet or exceed the bending radius specified by the manufacturer of the pipe or tubing.

b. Polybutylene water distribution pipe or tubing shall be supported or anchored at the beginning and end of long bends in accordance with the manufacturer's instructions.

Table 84.30-8
PIPE AND TUBING FOR
WATER SERVICES AND PRIVATE WATER MAINS

Material	Standard
Acrylonitrile butadiene styrene (ABS) ^a	ASTM D1527; ASTM D2282
Brass	ASTM B43
Cast iron	ASTM A377; AWWA C115/A21.15
Chlorinated polyvinyl chloride (CPVC) ^a	ASTM D2846; ASTM F441; ASTM F442; ASTM F443
Copper ^b	ASTM B42; ASTM B88
Ductile iron	ASTM A377; AWWA C115/A21.15; AWWA C151/A21.51
Galvanized steel	ASTM A53; ASTM A120
Polybutylene (PB) ^a	ASTM D2662; ASTM D2666; ASTM D3000; ASTM D3309
Polyethylene (PE) ^a	ASTM D2239; ASTM D2737; ASTM D2104; ASTM D2447; ASTM D3035
Polyvinyl chloride (PVC) ^a	ASTM D1785; ASTM D2241; ASTM D2740; ASTM D2672; AWWA C900
Stainless steel	ANSI B36.19

Note a: Plastic water service systems shall be installed in accordance with ASTM D2774. See Appendix for further explanatory material.

Note b: Copper tubing, type M, may not be installed underground.

Table 84.30-9
WATER DISTRIBUTION PIPE AND TUBING

Material	Standard
Brass	ASTM B43
Cast iron	ASTM A377; AWWA C115/A21.15
Chlorinated polyvinyl chloride (CPVC) ^a	ASTM D2846
Copper ^b	ASTM B42; ASTM B88
Ductile iron	ASTM A377; AWWA C115/A21.15; AWWA C151/A21.51
Galvanized steel	ASTM A53; ASTM A120
Polybutylene (PB) ^a for agricultural use and pure-water use	ASTM D3309
Stainless steel	ANSI B36.19M; ASTM A270; ASTM A450

Note a: Plastic pipe and tubing installed underground shall be in accordance with ASTM D2774. See Appendix for further explanatory material.

Note b: Copper tubing, type M, may not be installed underground.

Table 84.30-9m
MINIMUM BENDING RADIUS OF POLYBUTYLENE
WATER DISTRIBUTION PIPE AND TUBING

Pipe Size (inches)	Bending Radius (inches)	Tubing Size (inches)	Bending Radius (inches)
¾	12¾	¾	4¾
1	15¾	¾	6
1¼	20	½	7½
1½	23	¾	10½
2	28¾	1	13½
		1¼	16½
		1½	19½
		2	25½

Note: See Appendix for further explanatory material.

Table 84.30-10
EXTERIOR TURF
SPRINKLER SYSTEM PIPE AND TUBING

Material	Standard
Acrylonitrile butadiene styrene (ABS) ^a	ASTM D1527; ASTM D2282
Brass	ASTM B43
Cast iron	ASTM A377; AWWA C115/A21.15
Chlorinated polyvinyl chloride (CPVC) ^a	ASTM F441; ASTM F442; ASTM F443; ASTM D2846
Copper ^b	ASTM B88
Ductile iron	ASTM A377; AWWA C115/A21.15; AWWA C151/A21.51
Galvanized steel	ASTM A53; ASTM A120
Polybutylene (PB) ^a	ASTM D2666; ASTM D3000; ASTM D2662; ASTM D3309
Polyethylene (PE) ^a	ASTM D2104; ASTM D2239; ASTM D2447; ASTM D3035; ASTM D2737
Polyvinyl chloride (PVC) ^a	ASTM D1785; ASTM D2241; ASTM D2672; AWWA C900; ASTM D2740

Note a: Plastic pipe and tubing installed underground shall be in accordance with ASTM D2774. See Appendix for further explanatory material.

Note b: Copper tubing, type M, may not be installed underground.

(5) **PIPE FITTINGS AND VALVES.** (a) *Fittings.* Pipe fittings shall conform to the pipe material standards listed in this chapter or one of the standards listed in Table 84.30-11. Threaded drain pipe fittings shall be of the recessed drainage type.

(b) *Water supply valves.* 1. Control valves for water services and private water mains shall be designed and constructed to withstand a minimum pressure of 125 psig at 73.4°F.

2. Control valves for water distribution systems shall be designed and constructed to withstand a minimum pressure of 100 psig at 180°F.

3. A control valve for water supply piping 3/4 inches through 4 inches in diameter which serves 2 or more plumbing fixtures shall have a nominal diameter at least equal to the piping and shall have a minimum Cv factor as specified in Table 84.30-10a.

84.30-10a
MINIMUM Cv FACTORS

Nominal Valve Diameters	Cv Factors
3/4	18
1	35.5
1 1/4	61
1 1/2	107
2	175
3	255
4	340

Note: The Cv factor is defined as the flow coefficient for valves, expressing the flow rate in gallons per minute of 60° with a one psi pressure drop across the valve.

(c) *Special fittings and valves.* 1. Water hammer arrestors shall conform to ANSI A112.26.1 or ASSE 1010.

2. Relief valves and automatic gas shutoff devices for hot water supply systems shall conform to ANSI Z21.22.

3. Water pressure reducing valves and strainers for water pressure reducing valves for domestic supply systems shall conform to ASSE 1003.

4. Hose connection vacuum breakers shall conform to ASSE 1011 or ASSE 1019.

5. Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012.

6. Reduced pressure principle backflow preventers shall conform to ASSE 1013.

7. Backwater valves shall conform to ANSI A112.14.1.

8. Pipe applied atmospheric type vacuum breakers shall conform to ASSE 1001.

9. Laboratory faucet vacuum breakers shall conform to ASSE 1035.

10. Trap seal primer valves shall conform to ASSE 1018.

(d) *Pipe saddles.* Pipe saddles shall be installed in accordance with the instructions of the saddle manufacturer and the following limitations:

Register, May, 1988, No. 389

1. Pipe saddles may be installed on private interceptor main sewers, building sewers, underground drain and vent pipe and tubing, and where otherwise approved by the department;

2. A saddle for drain piping shall have a radius in accordance with s. ILHR 82.30 (8) (a);

3. The material of the saddle shall be compatible with the materials of the pipes which are to be connected to the saddle;

4. The hole in the pipe which is to receive the saddle shall be drilled or cored to match the saddle outlet;

5. Straps or clamps which wrap around the pipe and saddle shall be provided by the manufacturer of the saddle;

6. Saddles shall be installed with straps or clamps which wrap around the pipe and saddle; and

7. Proper hangers or bedding shall be provided to maintain alignment between the opening in the pipe and the saddle.

Table 84.30-11
PIPE FITTINGS

Material	Standard
Acrylonitrile butadiene styrene (ABS)	ASTM D2465; ASTM D2468; ASTM D2469; ASTM D3311; ASTM F409
Cast bronze	ANSI B16.15; ANSI B16.24
Cast copper alloy	ANSI B16.18; ANSI B16.23; ANSI B16.26; ANSI B16.32
Cast iron	ANSI B16.4; ANSI B16.12; ANSI B16.1
Chlorinated polyvinyl chloride (CPVC)	ASTM F437; ASTM F438; ASTM F439
Copper	ANSI B16.22; ANSI B16.29; ANSI B16.43
Ductile iron and gray iron	ANSI/AWWA C110/A21.10; ANSI/AWWA C153/A21.53; ANSI B16.42
Malleable iron	ANSI B16.3
Polybutylene (PB)	ASTM D3309; ASTM F845
Polyethylene (PE)	ASTM D2609; ASTM D2683; ASTM D3197; ASTM D3261
Polyvinyl chloride (PVC)	ASTM D2464; ASTM D2466; ASTM D2467; ASTM D3036; ASTM D3311; ASTM F409
Stainless steel	ASTM A403
Steel ^a	ANSI B16.5; ANSI B16.9; ANSI B16.11; ANSI B16.28
Styrene-rubber (SR)	ASTM D2852

Note a: Steel fittings and malleable iron fittings to be used in a water supply system shall be galvanized-coated in accordance with ASTM A123.

(6) SPECIAL MATERIALS. (a) *Sheet lead*. Sheet lead for the following uses may not weigh less than indicated in subds. 1. to 3.

1. Safe pans, 4 pounds per square foot;
2. Site-fabricated flashings for vent pipes, 3 pounds per square foot; and
3. Prefabricated flashings for vent pipes, 2½ pounds per square foot.

(b) *Traps and fixture drain connection fittings.* Copper or tubular brass traps and fixture drain connections fittings shall be at least of 20 gage material.

(c) *Sheet copper.* Sheet copper for the following uses may not weigh less than indicated in subds. 1. and 2. and shall conform to ASTM B152.

1. Safe pans, 12 ounces per square foot;
2. Flashing for vent pipes, 8 ounces per square foot; and
3. Flush tank linings, 10 ounces per square foot.

(d) *Cleanout plugs.* Cleanout plugs shall be of brass or plastic. Brass cleanout plugs shall be used with metallic piping only and shall conform to ASTM A74. Plastic cleanout plugs shall conform to the requirements of sub. (5) (a).

(e) *Flush pipes and fittings.* Flush pipes and fittings shall be of nonferrous material and shall conform to ANSI A112.19.5.

(f) *Safing materials.* Safing materials made from chlorinated polyethylene shall conform to ASTM D4068.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.40 Joints and connections. (1) **GENERAL.** (a) *Tightness.* Joints and connections in the plumbing system shall be watertight and gastight for the pressure required by test or the system design, whichever is greater, with the exception of perforated or open joint piping.

Note: The testing requirements for tightness are in s. ILHR 82.21.

(b) *Preparation of pipe ends.* Pipe ends shall be prepared in accordance with the applicable pipe standard or the pipe or fitting manufacturer's instructions.

(c) *Prohibited joints and connections.* Unless otherwise permitted in this chapter or ch. ILHR 82 or 83, the following types of joints and connections shall be prohibited:

1. Cement or concrete joints;
2. Mastic or hot poured bituminous joints;
3. Elastomeric rolling o-rings between different diameter pipes;
4. Solvent cement joints between different types of plastic pipe; and
5. Roll grooving of galvanized steel pipe.

(2) **ABS PLASTIC PIPE.** Joints between acrylonitrile butadiene styrene plastic pipe or fittings shall be installed in accordance with pars. (a) to (c).

(a) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions.

1. Drain and vent systems. Mechanical push-on joints for drain and vent systems shall conform to ASTM D3212.

Register, May, 1988, No. 389

2. Water supply systems. Mechanical push-on joints and mechanical compression-type joints for water supply systems which use a flexible elastomeric seal shall conform to ASTM D3139.

(b) *Solvent cemented joints.* Solvent cemented joints shall be made in accordance with ASTM D2235 and its appendix, ASTM D2661 or ASTM F628.

1. Joint surfaces shall be clean and free of moisture.
2. Solvent cement conforming to ASTM D2235 shall be applied to all joint surfaces and the joint shall be made while the cement is wet.
3. Solvent cement shall be handled in accordance with ASTM F402.
4. Solvent cement used on pipes and fittings of a water supply system shall conform to NSF 14 and shall be certified by a nationally recognized testing agency as to conforming to NSF 14. The container for the solvent cement shall bear the certification mark of the testing agency.

Note: See Appendix for further explanatory material.

(c) *Threaded joints.* Threaded joints shall only be used on pipes of schedule 80 or heavier. Threaded joints shall conform to ANSI B1.20.1. The pipe shall be threaded with dies specifically designed for plastic pipe. Thread lubricant or tape approved for such use shall be applied to the male threads only.

(3) **BLACK STEEL PIPE.** Joints between black steel pipe or fittings shall be in accordance with pars. (a) to (d).

(a) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(b) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions.

(c) *Caulked joints.* Caulked joints shall only be used for drain or vent piping. Caulked joints for hub and spigot piping and fittings shall be firmly packed with oakum or hemp. Molten lead shall be poured in one operation not less than one inch deep and not to extend more than 1/8 inch below the rim of the pipe, and caulked tight. Paint, varnish or other coatings may not be used on the joining material until after the joint has been tested and approved.

1. Caulked joints for drain piping shall be used only in a vertical position.

2. Caulked joints for vent piping may be used for piping in a vertical or horizontal position.

(d) *Welded joints.* Joints between black steel pipe or fittings may be welded.

(4) **BRASS PIPE.** Joints between brass pipe or fittings shall be in accordance with the provisions of pars. (a) to (d).

(a) *Brazed joints.* All joint surfaces to be brazed shall be cleaned bright by other than chemical means. Brazing filler metal conforming to AWS A5.8 or other approved material shall be used. The joining of water sup-

ply piping shall be made with lead-free materials. "Lead-free" shall mean a chemical composition equal to or less than 0.2% of lead.

(b) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions. Mechanical push-on joints and mechanical compression type joints for water supply systems which use flexible elastomeric seals shall conform to ASTM D3139.

(c) *Soldered joints.* All joint surfaces to be soldered shall be cleaned bright by other than chemical means. A nontoxic flux shall be applied to all joint surfaces. Solder conforming to ASTM B32 or other approved material shall be used. The joining of water supply piping shall be made with lead-free materials. "Lead-free" shall mean a chemical composition equal to or less than 0.2% of lead.

(d) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(5) **CAST IRON PIPE.** Joints between cast iron pipe or fittings shall be installed in accordance with pars. (a) and (b).

(a) *Caulked joints.* 1. Drain and vent systems. Caulked joints for hub and spigot pipe of drain and vent systems shall be firmly packed with oakum or hemp. Molten lead shall be poured in one operation not less than one inch deep and not to extend more than $\frac{1}{8}$ inch below the rim of the pipe, and caulked tight. Paint, varnish or other coatings may not be used on the joining material until after the joint has been tested and approved.

2. Water supply systems. Joints for bell and spigot pipe of water supply systems shall be firmly packed with treated paper rope. Molten lead shall be poured in one operation to a depth of $2\frac{1}{2}$ inches.

(b) *Mechanical joints.* 1. Drain and vent systems. a. Mechanical push-on joints for drain and vent systems shall have gaskets which conform to ASTM C564.

b. Mechanical sleeve joints for drain and vent systems shall have a rubber sealing sleeve conforming to ASTM C564 or CISPI 310. Where a stainless steel band assembly is used, the band assembly shall conform to CISPI 310. Mechanical joints shall be installed in accordance with the manufacturer's instructions.

2. Water supply systems. Mechanical push-on joints and mechanical compression type joints for water supply systems shall conform to AWWA C111/A21.11. Lead tipped gaskets may not be used.

(c) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(6) **CPVC PLASTIC PIPE.** Joints between chlorinated polyvinyl chloride plastic pipe or fittings shall be installed in accordance with the provisions of pars. (a) to (c).

(a) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions. Mechanical push-on type joints which use flexible elastomeric seals shall conform to ASTM D3139.

(b) *Solvent cemented joints.* Solvent cemented joints shall be made in accordance with ASTM D2846 and its Appendix or ASTM F493 and its Appendix.

1. Joint surfaces shall be clean and free of moisture. A primer conforming to ASTM F656 shall be applied to all joint surfaces. The primer shall be purple in color.

2. Solvent cement conforming to ASTM F493 shall be applied to all joint surfaces and the joint shall be made while the cement is wet.

3. Solvent cement shall be handled in accordance with ASTM F402.

4. Solvent cement shall be orange in color.

5. Primer and solvent cement used on pipes and fittings of a water supply system shall conform to NSF 14 and shall be certified by a nationally recognized testing agency as to conforming to NSF 14. The containers for the primer and the solvent cement shall bear the certification mark of the testing agency.

Note: See Appendix for further explanatory material.

(c) *Threaded joints.* Threaded joints shall only be used on pipes of schedule 80 or heavier. Threaded joints shall conform to ANSI B1.20.1. The pipe shall be threaded with dies specifically designed for plastic pipe. Thread lubricant or tape approved for such use shall be applied to the male threads only.

(7) **CONCRETE PIPE.** Joints between concrete pipe or fittings shall be made by use of an elastomeric seal conforming to ASTM C443.

(8) **COPPER PIPE AND TUBING.** Joints between copper pipe, tubing or fittings shall be installed in accordance with pars. (a) to (e).

(a) *Brazed joints.* All joint surfaces to be brazed shall be cleaned bright by other than chemical means. Brazing filler metal conforming to AWS A5.8 or other approved material shall be used. The joining of water supply piping shall be made with lead-free materials. "Lead-free" shall mean a chemical composition equal to or less than 0.2% of lead.

(b) *Flared joints.* Flared joints may be used on annealed tubing for water supply systems and shall be made by the use of a tool designed for that operation.

(c) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions. Mechanical push-on joints and mechanical compression type joints for water supply systems which use flexible elastomeric seals shall conform to ASTM D3139.

(d) *Soldered joints.* All joint surfaces to be soldered shall be cleaned bright by other than chemical means. A nontoxic flux shall be applied to all joint surfaces. Solder conforming to ASTM B32 or other approved material shall be used. The joining of water supply piping shall be made with lead-free materials. "Lead-free" shall mean a chemical composition equal to or less than 0.2% of lead.

(e) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(9) **DUCTILE IRON PIPE.** (a) *Mechanical joints.* Mechanical push-on joints and mechanical compression type joints for water supply systems shall conform to AWWA C111/A21.11. Lead tipped gaskets may not be used.

(b) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(10) **GALVANIZED STEEL PIPE.** Joints between galvanized steel pipe or fittings or between galvanized steel pipe and cast iron fittings shall be installed in accordance with pars. (a) to (c).

(a) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(b) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions. Mechanical push-on joints and mechanical compression type joints for water supply systems which use flexible elastomeric seals shall conform to ASTM D3139.

(c) *Caulked joints.* Caulked joints shall only be used for drain or vent piping. Caulked joints for hub and spigot piping and fittings shall be firmly packed with oakum or hemp. Molten lead shall be poured in one operation not less than on inch deep and not to extend more than 1/8 inch below the rim of the pipe, and caulked tight. Paint, varnish or other coatings may not be used on the joining material until after the joint has been tested and approved.

1. Caulked joints for drain piping shall be used only for piping in a vertical position.

2. Caulked joints for vent piping may be used for piping in a vertical or horizontal position.

(11) **LEAD PIPE.** Joints between lead pipe or fittings shall be installed in accordance with pars. (a) and (b).

(a) *Burned joints.* Burned joints shall be uniformly fused together into one continuous piece. The thickness of the joint shall be at least as thick as the lead being joined. The filler metal shall be of the same material as the pipe.

(b) *Wiped joints.* A wiped joint shall be full wiped, having an exposed surface on each side of the joint not less than 3/4 inch and shall be at least 3/8 inch thick at the thickest point.

(12) **PB PLASTIC PIPE AND TUBING.** Joints between polybutylene plastic pipe and tubing or fittings shall be installed in accordance with pars. (a) to (c).

(a) *Flared joints.* Flared joints shall be made by use of a tool designed for that operation. Flared joints shall be made in accordance with ASTM D3140.

(b) *Heat fusion joints.* Heat fusion joints shall be made in accordance with ASTM D2657 and ASTM D3309. Heat fusion joints shall be of a socket fusion type.

1. Joint surfaces to be fused shall be clean and free of moisture.

2. All joint surfaces shall be heated to the temperature recommended by the pipe or fitting manufacturer and joined.

3. The joint shall be undisturbed until cool.

(c) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions. Mechanical push-on joints and mechanical compression type joints which use flexible elastomeric seals shall conform to ASTM D3139.

(13) PE PLASTIC PIPE AND TUBING. Joints between polyethylene plastic pipe, tubing or fittings shall be in accordance with pars. (a) to (c).

(a) *Flared joints.* Flared joints shall be made by use of a tool designed for that operation. Flared joints shall be made in accordance with ASTM D3140.

(b) *Heat fusion joints.* Heat fusion joints shall be made in accordance with ASTM D2657. Heat fusion joints shall be of a socket fusion type.

1. Joint surfaces to be fused shall be clean and free of moisture.

2. All joint surfaces shall be heated to the temperature recommended by the pipe or fitting manufacturer and joined.

3. The joint shall be undisturbed until cool.

(c) *Mechanical joints.* Mechanical joints may be installed in accordance with the manufacturer's instructions. Mechanical push-on joints and mechanical compression type joints which use flexible elastomeric seals shall conform to ASTM D3139.

(14) PVC PLASTIC PIPE. Joints between polyvinyl chloride plastic pipe or fittings shall be in accordance with pars. (a) to (c).

(a) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions.

1. Drain and vent systems. Mechanical push-on joints for drain and vent systems shall conform to ASTM D3212.

2. Water supply systems. Mechanical push-on joints and mechanical compression type joints for water supply systems which use flexible elastomeric seals shall conform to ASTM D3139.

(b) *Solvent cemented joints.* Solvent cemented joints shall be made in accordance with ASTM D2855.

1. Joint surfaces shall be clean and free of moisture. A primer conforming to ASTM F656 shall be applied to all joint surfaces.

2. Solvent cement conforming to ASTM D2564 shall be applied to all joint surfaces and the joint shall be made while the cement is wet.

3. Solvent cement shall be handled in accordance with ASTM F402.

4. Primer and solvent cement used on pipes and fittings of a water supply system shall conform to NSF 14 and shall be certified by a nationally recognized testing agency as to conforming to NSF 14. The containers

for the primer and the solvent cement shall bear the certification mark of the testing agency.

Note: See Appendix for further explanatory material.

(c) *Threaded joints.* Threaded joints shall only be used on pipes of schedule 80 or heavier. Threaded joints shall conform to ANSI B1.20.1. The pipe shall be threaded with dies specifically designed for plastic pipe. Thread lubricant or tape approved for such use shall be applied to the male threads only.

(15) **STAINLESS STEEL.** Joints between stainless steel pipe or fittings shall be installed in accordance with the provisions of pars. (a) to (c).

(a) *Mechanical joints.* Mechanical joints shall be installed in accordance with the manufacturer's instructions. Mechanical push-on type joints which use flexible elastomeric seals shall conform to ASTM D3139.

(b) *Threaded joints.* Threaded joints shall conform to ANSI B1.20.1. Pipe joint compound or tape shall be used on the male threads only.

(c) *Welded joints.* Joints between stainless steel pipe or fittings may be welded.

(16) **VITRIFIED CLAY PIPE.** Joints between vitrified clay pipe or fittings shall be made by use of elastomeric seals conforming to ASTM C425.

(17) **JOINTS BETWEEN PIPE AND FITTINGS OF DIFFERENT MATERIALS.** Connections between pipes of different materials shall be made with mechanical compression type joints, installed in accordance with manufacturer's instructions or as specified in pars. (a) to (e).

(a) *Copper to cast iron.* Connections between copper pipe or tube and cast iron pipe shall be by means of either caulked joints in accordance with sub. (5) (a) or threaded fittings in accordance sub. (5) (c).

(b) *Copper to galvanized steel.* Connections between copper pipe or tube and galvanized steel pipe shall be by use of an adapter fitting. The copper pipe shall be soldered to the adapter in accordance with sub. (8) (d). The galvanized steel shall be threaded to the adapter in accordance with sub. (10) (a).

(c) *Cast iron to steel or brass pipe.* Connections between cast iron pipe and galvanized or black steel or brass pipe shall be by means of:

1. Caulked joints in accordance with sub. (5) (a); or
2. Threaded joints in accordance with sub. (5) (c).

(d) *Plastic to other materials.* 1. Connections between plastic pipe and cast iron pipe shall be by means of:

- a. Caulked joints in accordance with sub. (5) (a); or
- b. Threaded joints in accordance with sub. (5) (c).

2. Connections between different types of plastic pipe or between plastic pipe and other piping materials other than cast iron shall be by means of threaded joints in accordance with sub. (14) (c).

(e) *Lead to other piping materials.* Connections between lead pipe and other piping materials shall be by use of an adapter fitting conforming to

s. ILHR 84.30 (5) (a). The lead pipe shall be caulked or burned to the adapter fitting in accordance with sub. (11).

(18) **CONNECTION OF FIXTURES.** Flanged fixtures which have integral traps shall be mechanically fastened to the drain piping by means of a compatible fitting. The joint between the fixture and the fitting shall be sealed with a watertight gasket or setting compound.

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.50 Alternate approvals and experimental approvals. (1) **GENERAL.** The provisions of chs. ILHR 82 to 84 are not intended to prevent the use of a plumbing material or product not specifically addressed therein if the plumbing material or product has been approved by the department.

(2) **ALTERNATE APPROVAL.** (a) Plumbing materials or products determined by the department to comply with the intent of chs. ILHR 82 to 84 and ch. 145, Stats., and not approved under s. ILHR 84.10, shall be issued an alternate approval. Alternate approvals shall be issued by the department in writing.

(b) The department may require the submission of any information deemed necessary for review. Sufficient evidence shall be submitted to the department to substantiate:

1. Assertions of function and performance; and
2. Compliance with the intent of chs. ILHR 82 to 84 and ch. 145, Stats.

(c) The department shall review and make a determination on an application for alternate approval within 3 months of receipt of all information and fees required to complete the review.

(d) The department may impose specific conditions in issuing an alternate approval, including an expiration date for the alternate approval. Violations of the conditions under which an alternate approval is issued shall constitute a violation of this chapter.

(e) If, upon review, the department determines that a plumbing material or product does not comply with the intent of chs. ILHR 82 to 84 and ch. 145, Stats., the request for alternate approval shall be denied in writing.

(3) **EXPERIMENTAL APPROVAL.** (a) The department may allow the installation of a plumbing material or product for the purpose of proving compliance with the intent of chs. ILHR 82 to 84 and ch. 145, Stats.

(b) An experimental approval shall be required for each plumbing material or product to be installed for the purpose of proving compliance with the intent of chs. ILHR 82 to 84 and ch. 145, Stats. A separate experimental approval shall be obtained for each product where such a product is to be used. Experimental approvals shall be issued by the department in writing. Experimental approvals shall be denied by the department in writing.

(c) The department may require the submission of any information deemed necessary for review.

(d) The department may limit the number of applications it will accept for experimental approval of products.

(e) The department shall review and make a determination on an application for experimental approval within 6 months of receipt of all information and fees required to complete the review.

(f) The department may impose specific conditions in issuing an experimental approval. Violations of the conditions under which an experimental approval is issued shall constitute a violation of this chapter.

(g) If the department issues an experimental approval:

1. Plans detailing the installation of the plumbing material or product shall be submitted to the department in accordance with s. ILHR 82.20 (4) or 83.07 (2).

2. A copy of the experimental approval shall be attached to the submitted plans and approved plans.

3. A letter of consent from the owner of the installation shall be attached to the submitted plans and approved plans. The letter shall acknowledge that the owner has received and read a copy of the experimental approval and s. ILHR 84.50.

4. The completed installation shall be inspected for compliance with the approved plans by the department. A report on the completed installation shall be written by the department.

5. A written report, from the party who was issued the experimental approval, shall be submitted to the department detailing the function and performance of the installed plumbing material or product. The report shall be completed at time intervals specified by the department, but not less than once a year.

6. On-site inspections shall be performed by the department at time intervals specified by the department, but not less than once a year. A report on the inspection shall be written by the department. The department may assess a fee for the inspection.

7. Five years after the date of the completed installation the department shall within 6 months order the removal of the plumbing material or product or issue an alternate approval.

(h) If chs. ILHR 82 to 84 or ch. 145, Stats., are revised to include or permit an experimental plumbing material or product to conform with the intent of chs. ILHR 82 to 84 and ch. 145, Stats., the department shall waive the requirements of par. (f) as to that material or product.

(4) MODIFICATIONS. If a plumbing material or product with an alternate or experimental approval or the installation of an experimentally approved plumbing material or product is modified or additional assertions of function or performance are made, the alternate or experimental approval shall be considered null and void, unless the product is resubmitted to the department for review and the approval is reaffirmed.

(5) REVOCATION. The department may revoke an alternate or experimental approval issued under this section for any false statements or misrepresentations of facts or data on which the alternate or experimental approval was based or as a result of product failure.

(6) LIMITATIONS. An alternate or experimental approval of a plumbing material or product issued by the department may not be construed as

an assumption of any responsibility for defects in design, construction, or performance of any plumbing material or product nor for any damages that may result.

(7) FEES. Fees for the review of a plumbing material or product under this section and any required on-site inspections shall be submitted in accordance with s. Ind 69.23 (5) (c) or (d), and (e).

History: Cr. Register, May, 1988, No. 389, eff. 6-1-88

ILHR 84.60 Incorporation of standards by reference. (1) CONSENT. Pursuant to s. 227.025, Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of the standards listed in sub. (4).

(2) COPIES. Copies of the adopted standards are on file in the offices of the department, the secretary of state and the revisor of statutes. Copies may be purchased through the respective organizations listed in Tables 84.60-1 to 84.60-10.

(3) INTERIM AMENDMENTS. Interim amendments of the adopted standards shall have no effect in the state until such time as this section is correspondingly revised to reflect the changes.

(4) ADOPTION OF STANDARDS. The standards referenced in Tables 84.60-1 to 84.60-10 are hereby incorporated by reference into this chapter.

Table 84.60-1

AHAM	Association of Home Appliance Manufacturers 20 North Wacker Drive Chicago, Illinois 60606
Standard Reference Number	Title
DW-1-82	Household Dishwashers

Table 84.60-2

ANSI	American National Standards Institute, Inc. 1430 Broadway New York, New York 10018
Standard Reference Number	Title
1. A112.6.1M-79	Supports for Off-the-Floor Plumbing Fixtures for Public Use
2. A112.14.1-75	Backwater Valves
3. A112.18.1M-79	Finished and Rough Brass Plumbing Fixture Fittings
4. A112.19.1M-79	Enameled Cast Iron Plumbing Fixtures
5. A112.19.2M-82	Vitreous China Plumbing Fixtures

Register, May, 1988, No. 389

Standard Reference Number	Title
6. A112.19.3-76	Stainless Steel Plumbing Fixtures (Designed for Residential Use)
7. A112.19.4-77	Porcelain Enameled Formed Steel Plumbing Fixtures
8. A112.19.5-79	Trim for Water Closet Bowls, Tanks and Urinals (Dimensional Standards)
9. A112.21.1M-80	Floor Drains
10. A112.21.2-71	Roof Drains
11. A112.26.1-84	Water Hammer Arrestors
12. B1.20.1-83	Pipe Threads, General Purpose (Inch)
13. B16.1-75	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800
14. B16.3-77	Malleable Iron Threaded Fittings, Class 150 and 300
15. B16.4-77	Cast Iron Threaded Fittings, Class 125 and 250
16. B16.5-81	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys
17. B16.9-78	Factory-Made Wrought Steel Buttwelding Fittings
18. B16.11-80	Forged Steel Fittings, Socket-Welded and Threaded
19. B16.12-83	Cast Iron Threaded Drainage Fittings
20. B16.15-78	Cast Bronze Threaded Fittings, Class 125 and 250
21. B16.18-78	Cast Copper Alloy Solder-Joint Pressure Fittings
22. B16.22-80	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
23. B16.23-76	Cast Copper Alloy Solder Joint Drainage Fittings (DWV)
24. B16.24-79	Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300
25. B16.26-83	Cast Copper Alloy Fittings for Flared Copper Tubes
26. B16.28-78	Wrought Steel Buttwelding Short Radius Elbows and Returns
27. B16.29-80	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV)
28. B16.32-79	Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems
29. B16.42-79	Fittings, Class 150 and 300, Ductile Iron Pipe Flanges and Flanged
30. B16.43-82	Wrought Copper and Copper Alloy Solder Joint Fittings for Solvent Drainage Systems
31. B36.19M-85	Stainless Steel Pipe
32. Z21.22-79	Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems
33. Z124.1-80	Plastic Bathtub Units
34. Z124.2-80	Plastic Shower Receptors and Shower Stalls

Standard Reference Number	Title
35. Z124.3-80	Plastic Lavatories
36. Z124.4-83	Plastic Water Closet Bowls and Tanks

Table 84.60-3

ARI	Air-Conditioning and Refrigeration Institute 1815 North Fort Myer Drive Arlington, Virginia 22209
ARI-1010-82	Drinking-Fountains and Self-Contained, Mechanically- Refrigerated Drinking- Water Coolers

Table 84.60-4

ASSE	American Society of Sanitary Engineering P.O. Box 9712 Bay Village, Ohio 44140
------	--

Standard Reference Number	Title
1. 1001-82	Pipe Applied Atmospheric Type Vacuum Breakers
2. 1002-79	Water Closet Flush Tank Ball Cocks
3. 1003-81	Water Pressure Reducing Valves for Domestic Water Supply Systems
4. 1004-67	Commercial Dishwashing Machines
5. 1005-67	Water Heater Drain Valves, ¾" Iron Pipe Size
6. 1006-79	Household Dishwashers
7. 1007-79	Home Laundry Equipment
8. 1008-79	Household Food Waste Disposer Units
9. 1009-70	Commercial Food Waste Disposer Units
10. 1010-82	Water Hammer Arrestors
11. 1011-81	Hose Connection Vacuum Breakers
12. 1012-78	Backflow Preventers with Intermediate Atmospheric Vent
13. 1013-80	Reduced Pressure Principle Backflow Preventers, Including Appendix
14. 1014-79	Handheld Showers
15. 1018-78	Trap Seal Primer Valves
16. 1019-78	Wall Hydrants, Frost Proof Automatic Draining, Anti-Backflow Types
17. 1023-79	Hot Water Dispensers, Household Storage Type, Electrical

Standard Reference Number	Title
18. 1025-78	Diverters for Plumbing Faucets with Hose Spray, Anti-Siphon Type, Residential Applications
19. 1035-81	Laboratory Faucet Vacuum Breakers

Table 84.60-5

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, Pennsylvania 19103
Standard Reference Number	Title
1. A53-82	Pipe, Steel, Black and Hot-Dipped, Zinc- Coated Welded and Seamless, Specification for
2. A74-82	Cast Iron Soil Pipe and Fittings, Specification for
3. A120-82	Pipe, Steel, Black and Hot-Dipped Zinc- Coated (Galvanized) Welded and Seamless, for Ordinary Uses, Specification for
4. A123-78	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates and Strip, Specification for
5. A270-80	Seamless and Welded Austenitic Stainless Steel Sanitary Tubing, Specification for
6. A377-79	Gray Iron and Ductile Iron Pressure Pipe, Specification for
7. A403-82a	Wrought Austenitic Stainless Steel Piping Fittings, Specification for
8. A450-82	General Requirements for Carbon, Ferritic Alloy, and Austenitic Alloy Steel Tubes, Specification for
9. B32-76	Solder Metal, Specification for
10. B42-83	Seamless Copper Pipe, Standard Sizes, Specification for
11. B43-80	Seamless Red Brass Pipe, Standard Sizes, Specification for
12. B75-81a	Seamless Copper Tube, Specification for
13. B88-83	Seamless Copper Water Tube, Specification for
14. B152-83	Copper Sheet, Strip, Plate, and Rolled Bar, Specification for
15. B251-81	General Requirements for Wrought Seamless Copper and Copper-Alloy Tube, Specification for
16. B302-81	Threadless Copper Pipe, Specification for

Standard Reference Number	Title
17. B306-81	Copper Drainage Tube (DWV), Specification for
18. C4-62(R1981)	Clay Drain Tile, Specification for
19. C14-82	Concrete Sewer, Storm Drain, and Culvert Pipe, Specification for
20. C76-83	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, Specification for
21. C425-77(R1982)	Compression Joints for Vitrified Clay Pipe and Fittings, Specification for
22. C443-79	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets, Specification for
23. C564-70(R1982)	Rubber Gaskets for Cast Iron Soil Pipe and Fittings, Specification for
24. C700-78a(R1983)	Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated, Specification for
25. D1527-77(R1982)	Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80, Specification for
26. D1785-83	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120, Specification for
27. D2104-74(R1982)	Polyethylene (PE) Plastic Pipe, Schedule 40, Specification for
28. D2235-81	Solvent Cement for Acrylonitrile- Butadiene-Styrene (ABS) Plastic Pipe and Fittings, Specification for
29. D2239-83	Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter, Specification for
30. D2241-83	Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR), Specification for
31. D2282-82	Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR), Specification for
32. D2321-83a(R1980)	Underground Installation of Flexible Thermoplastic Sewer Pipe, Recommended Practice for
33. D2447-74(R1982)	Polyethylene (PE) Plastic Pipe, Schedules 40 and 80 Based on Outside Diameter, Specification for
34. D2464-76	Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80, Specification for
35. D2465-73(R1979)	Threaded Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80, Specification for
36. D2466-78	Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40, Specification for
37. D2467-76a	Socket-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80, Specification for

Standard Reference Number	Title
38. D2468-80	Acrylonitrile-Butadiene-Styrene (ABS), Plastic Pipe Fittings, Schedule 40, Specification for
39. D2469-76	Socket-Type Acrylonitrile-Butadiene- Styrene (ABS) Plastic Pipe Fittings, Schedule 80, Specification for
40. D2564-80	Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings, Specification for
41. D2609-74	Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe, Specification for
42. D2657-79	Heat-Joining of Polyolefin Pipe and Fittings, Specification for
43. D2661-82	Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings, Specification for
44. D2662-83	Polybutylene (PB) Plastic Pipe (SIDR- PR), Based on Controlled Inside Diameter, Specification for
45. D2665-82	Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings, Specification for
46. D2666-83	Polybutylene (PB) Plastic Tubing, Specification for
47. D2672-80	Bell-End Poly (Vinyl Chloride) (PVC) Pipe, Specification for
48. D2680-80	Acrylonitrile-Butadiene-Styrene (ABS) Composite Sewer Piping, Specification for
49. D2683-82	Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing, Specification for
50. D2729-83	Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Specification for
51. D2737-83	Polyethylene (PE) Plastic Tubing, Specification for
52. D2740-80	Poly (Vinyl Chloride) (PVC) Plastic Tubing, Specification for
53. D2751-83a	Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings, Specification for
54. D2774-72(R1978)	Underground Installation of Thermoplastic Pressure Piping, Recommended Practice for
55. D2846-82	Chlorinated Polyvinyl Chloride (CPVC) Plastic Hot and Cold-Water Distribution Systems, Specification for
56. D2852-81	Styrene-Rubber (SR) Plastic Drain Pipe and Fittings, Specification for

Standard Reference Number	Title
57. D2855-83	Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings, Recommended Practice for
58. D3000-73(R1981)	Polybutylene (PB) Plastic Pipe (SDR-PR) Based on Outside Diameter, Specification for
59. D3033-83	Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Specification for
60. D3034-83	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings, Specification for
61. D3035-81	Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter, Specification for
62. D3036-73	Socket-Type Polyvinyl Chloride (PVC) Plastic Line Couplings, Specification for
63. D3139-77	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals, Specification for
64. D3140-72(R1977)	Flaring Polyolefin Pipe and Tubing, Recommended Practice for
65. D3197-73	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals, Specification for
66. D3212-81	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals, Specification for
67. D3261-82	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing, Specification for
68. D3298-81	Perforated Styrene-Rubber (SR) Plastic Drain Pipe, Specification for
69. D3309-83	Polybutylene (PB) Plastic Hot-and Cold-Water Distribution Systems, Specification for
70. D3311-82	Drain, Waste, and Vent (DWV) Plastic Fittings Patterns, Specification for
71. D4068-81	Chlorinated Polyethylene (CPE) Sheetting for Concealed Water Containment Membrane, Specification for
72. F402-80	Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings, Practice for
73. F405-82a	Corrugated Polyethylene (PE) Tubing and Fittings, Specification for
74. F409-81	Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings, Specification for

Standard Reference Number	Title
75. F437-82	Threaded Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80, Specification for
76. F438-82	Socket-Type Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 40, Specification for
77. F439-82	Socket-Type Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80, Specification for
78. F441-82	Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80, Specification for
79. F442-82	Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe (SDR-PR), Specification for
80. F443-77	Bell-End Chlorinated Polyvinyl Chloride (CPVC) Pipe, Schedule 40, Specification for
81. F477-76(R1981)	Elastomeric Seals (Gaskets) for Joining Plastic Pipe, Specification for
82. F493-80	Solvent Cements for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe and Fittings, Specification for
83. F628-81	Acrylonitrile-Butadiene-Styrene (ABS) Plastic Drain, Waste, and Vent Pipe Having a Foam Core, Specification for
84. F656-80	Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride)(PVC) Plastic Pipe and Fittings Specification for
85. F845-84	Plastic Insert Fittings for Polybutylene (PB) Tubing, Specification for

Table 84.60-6

AWS	American Welding Society 2501 N.W. 7th Street Miami, Florida 33125
Standard Reference Number	Title
AWS A5.8-81	Brazing Filler Metal, Specification for

Table 84.60-7

AWWA	American Water Works Association Data Processing Department 6666 West Quincy Avenue Denver, Colorado 80235
-------------	---

Standard Reference Number	Title
1. C110/A21.10-82	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
2. C111/A21.11-80	American National Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
3. C115/A21.15-83	American National Standard for Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges
4. C151/A21.51-81	American National Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids
5. C153/A21.53-84	American National Standard for Ductile-Iron Compact Fittings, 3 in. through 12 in. for Water and Other Liquids
6. C900-81	American National Standard for Pressure Pipe, 4 in. through 12 in. for Water, Polyvinyl Chloride (PVC)

Table 84.60-8

CISPI	Cast Iron Soil Pipe Institute 1499 Chain Bridge Road, Suite 203 McLean, Virginia 22101
Standard Reference Number	Title
1. 301-82	Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems, Specification for
2. 310-82	CISPI's Patented Joints for Use in Connection with Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems, Specification for

Table 84.60-9

FS	Federal Specifications* National Bureau of Standards Office of Engineering Standards U.S. Department of Commerce Washington, D.C. 20234 *Standards are available from the Superintendent of Documents U.S. Government Printing Office, Washington, D.C. 20402
WW-P-405a	Corrugated Pipe (Iron or Steel, Zinc Coated), September 1968, with Amendment 1, September 1970

Table 84.60-10

NSF	National Sanitation Foundation 3475 Plymouth Road P.O. Box 1468 Ann Arbor, Michigan 48106
Standard Reference Number	Title
Standard 14-85	Plastic Piping Compounds and Related Materials

Table 84.60-11

Standard Reference Number	Title
WQA	Water Quality Association 4151 Naperville Road Lisle, Illinois 60532
Standard Reference Number	Title
S-100-85	Household, Commercial and Portable Exchange Water Softeners

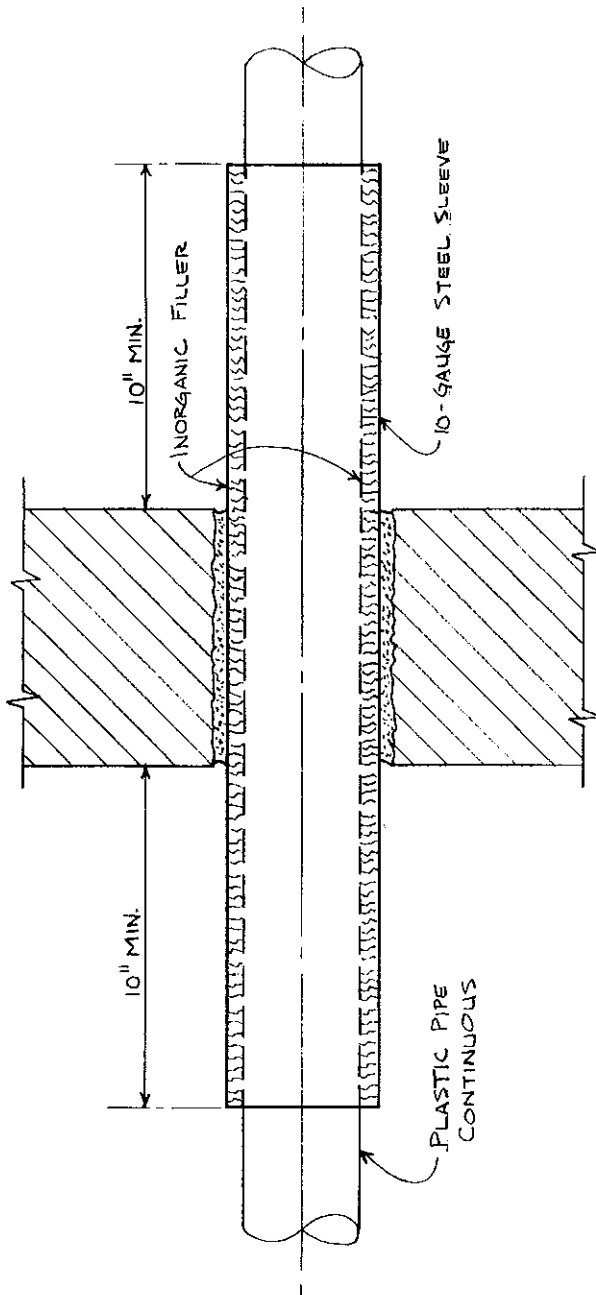
History: Cr. Register, May, 1988, No. 389, eff. 6-1-88.

APPENDIX

The material contained in this 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.

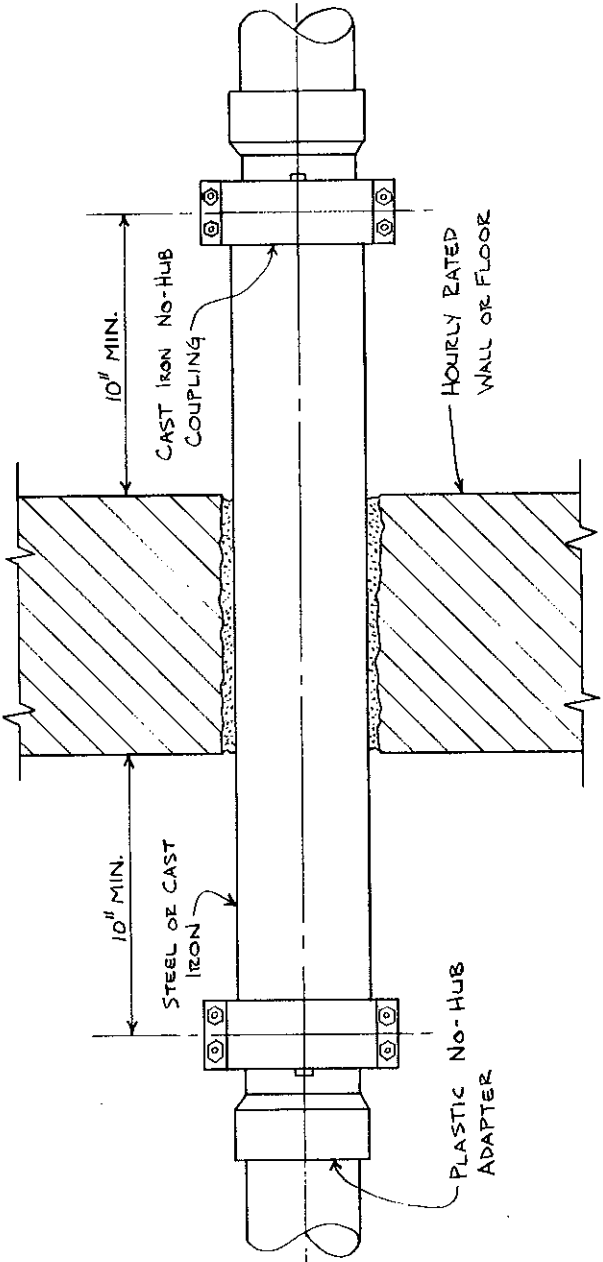
A-84.13 Penetrations of fire resistive assemblies. The following sketches depict possible methods of penetrating fire resistive assemblies with plumbing piping systems. For the current acceptable methods, contact the Bureau of Buildings and Structures, P.O. Box 7969, Madison, Wisconsin 53707.

A-84.13 Penetrations of fire resistive assemblies.



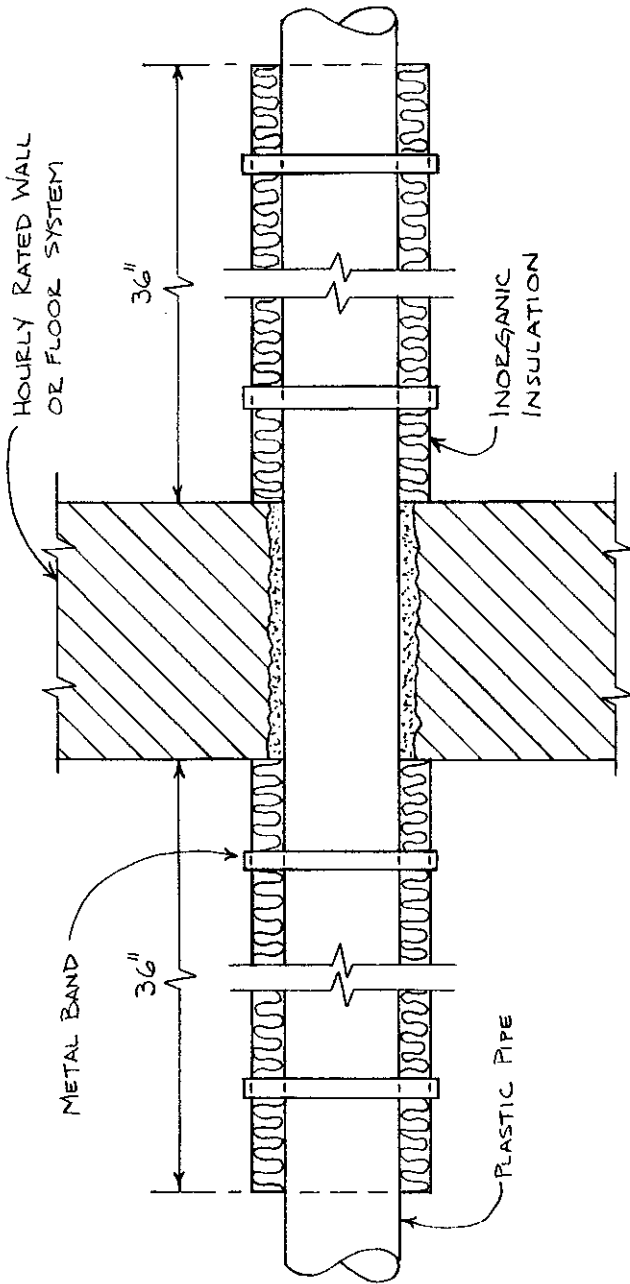
10" GA. SLEEVE ONE INCH DIA. LARGER THAN PIPE

A-84.13 Penetrations of fire resistive assemblies.



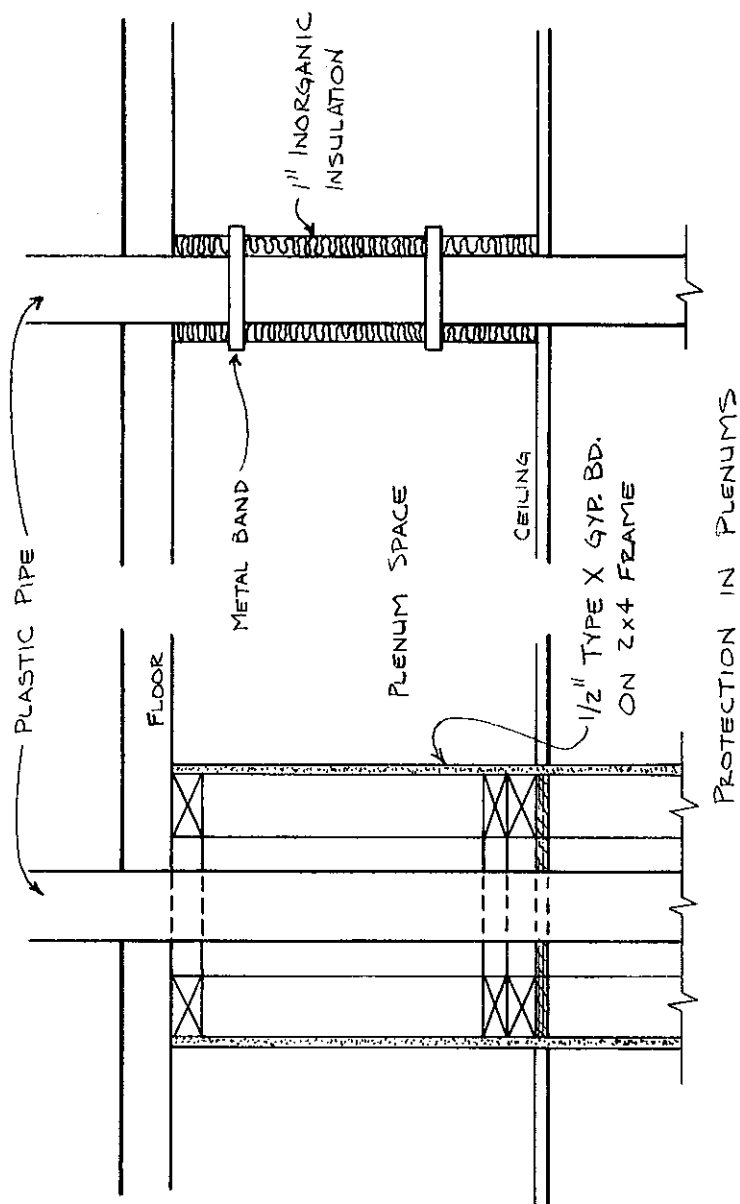
SUBSTITUTION OF CAST IRON OR STEEL PIPE

A-84.13 Penetrations of fire resistive assemblies.



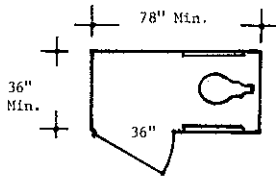
WRAP PLASTIC WITH 1" THICK INSULATION

A-84.13 Penetrations of fire resistive assemblies.



A-84.20 (3) ACCESSIBLE TOILET ROOMS AND SANITARY FACILITIES. The following sketches and diagrams are a reprint from the 1986-1987 edition of the Building and Heating, Ventilating and Air Conditioning Code, chapters ILHR 50-64. For the current accessibility requirements, contact the Bureau of Buildings and Structures, P.O. Box 7969, Madison, Wisconsin 53707.

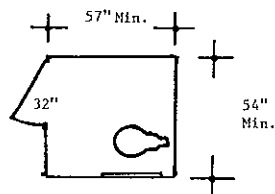
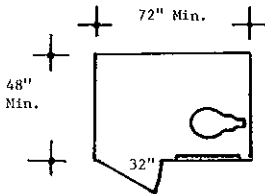
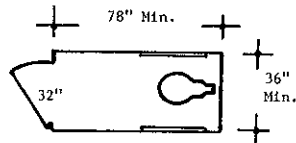
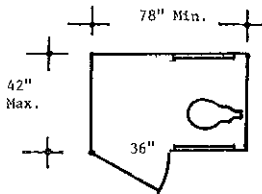
EXAMPLES OF ACCESSIBLE TOILET COMPARTMENTS
AS SPECIFIED IN TABLE 52.04-A



Recommended fixtures:

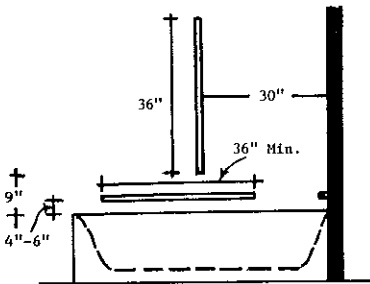
1. Elongated bowl;
2. Wall mounted.

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

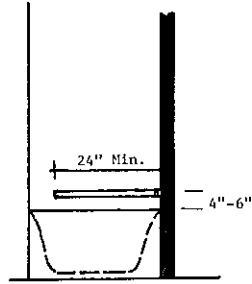


The door of the 54" x 57" water closet compartment having a frontal approach should not align with the placement of the water closet.

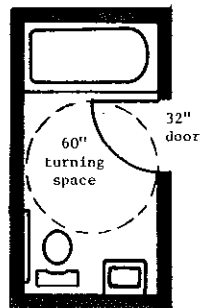
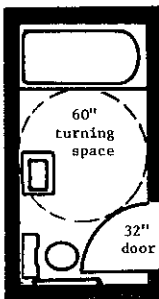
ACCESSIBLE BATHING FACILITIES



Side Elevation - Bathtub

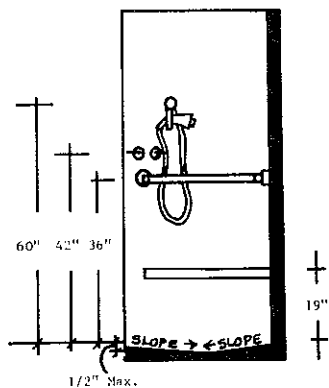


End Elevation - Bathtub

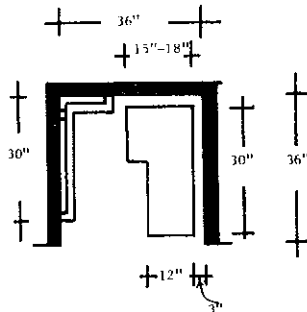


These diagrams are examples of accessible bathrooms which may be used for motels, hotels, hospitals and nursing homes.

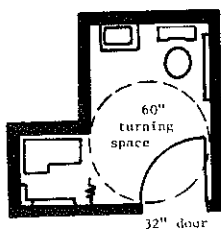
ACCESSIBLE BATHING FACILITIES



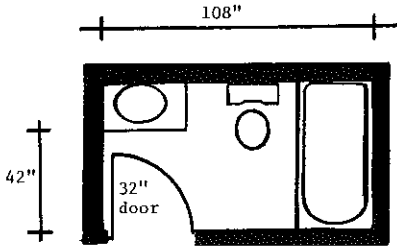
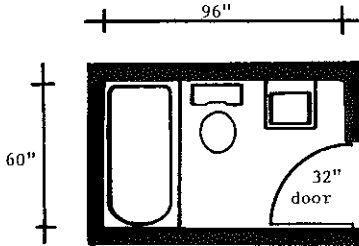
Section View - Shower



Plan View - Shower

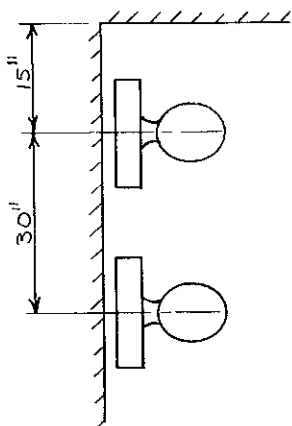


EXAMPLES OF ADAPTABLE BATHROOM LAYOUTS
FOR RESIDENTIAL LIVING UNITS
(not including hotels and motels)

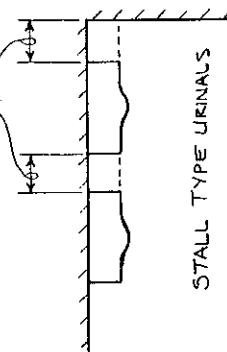


These examples may be modified for accessibility by using outward swinging doors or pocket sliding doors.

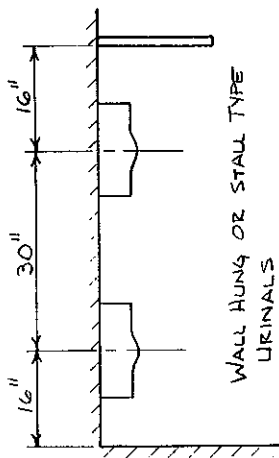
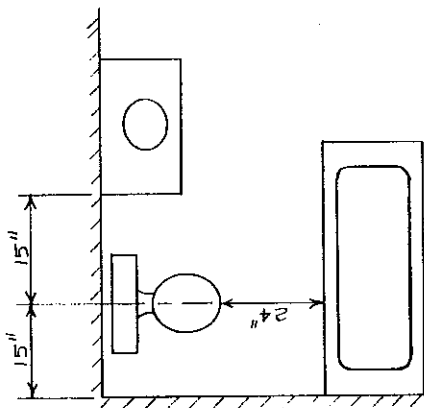
A-84.20 (4) Spacing of plumbing fixtures.



IF LESS THAN 12" SPACE MUST
BE FILLED FLUSH WITH FRONT
AND TOP OF URINAL

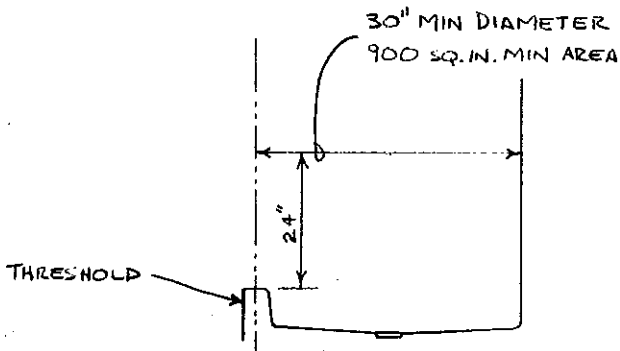
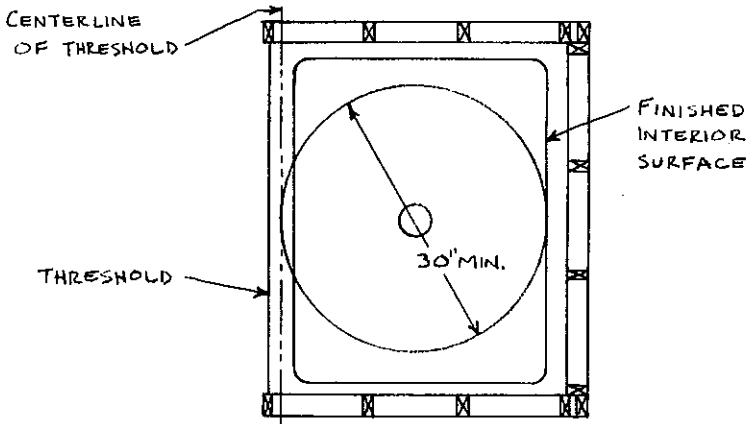


STALL TYPE URINALS

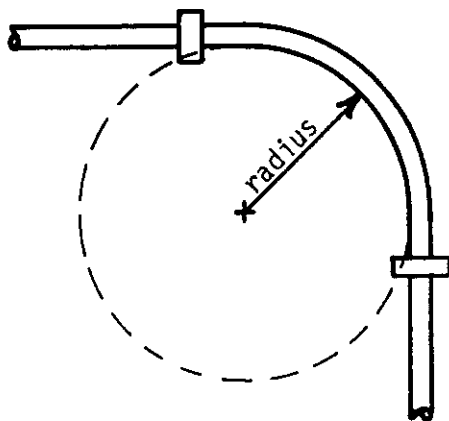


WALL HUNG OR STALL TYPE
URINALS

A-84.20 (4) Minimum size of shower compartments.



A-84.30(1) Measuring radius of
a bend in PB pipe or tubing



A-Tables 84.30-8 and -9. ASTM D2774. The following is a reprint of excerpts from ASTM D2774-72(R1978), Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.



Designation: D 2774 - 72 (Reapproved 1983)

Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping¹

This standard is issued under the fixed designation D 2774; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This method has been approved for use by agencies of the Department of Defense and for listing in the DOD Index of Specification and Standards

INTRODUCTION

In general, thermoplastic pressure pipe can support earth loads without sustaining excessive stress by mobilizing lateral passive soil forces and internal pressure forces. Thermoplastics have the ability to be deformed without a proportionate increase in stress allowing internal forces to oppose external forces. Proper installation technique ensures that the necessary passive soil pressures at the sides of the pipe will be developed and maintained.

Soils in which trenches are dug should be examined and identified and the trenches prepared and backfilled in accordance with sound bedding practices and this recommendation.

1. Scope

1.1 This recommended practice covers procedures and references ASTM specifications for underground installation of thermoplastic pressure piping, 6 in. nominal size and smaller. It is beyond the scope of this document to describe these procedures in detail since it is recognized that significant differences exist in their implementation depending on kind and type of pipe material, pipe size and wall thickness, soil conditions, and the specific end use. Specific pipe characteristics and end use requirements may dictate modification of the procedures stated or referenced herein.

NOTE—The values stated in U.S. customary units are to be regarded as the standard.

1.2 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Specific precautionary statements are given in Section 6.*

2. Referenced Documents

2.1 ASTM Standards:

2.1.1 Pipe and Tubing:

- D 1503 Specification for Cellulose Acetate Butyrate (CAB) Plastic Pipe, Schedule 40²
- D 1527 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80²
- D 1785 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120²

D2104 Specification for Polyethylene (PE) Plastic Pipe, Schedule 40²

D2239 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter²

D2241 Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR) Series²

D2282 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)²

D2446 Specification for Cellulose Acetate Butyrate (CAB) Plastic Pipe (SDR-PR) and Tubing²

D2447 Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80 Based on Outside Diameter²

D2662 Specification for Polybutylene (PB) Plastic Pipe (SDR-PR)³

D2666 Specification for Polybutylene (PB) Plastic Tubing³

D2672 Specification for Joints for IPS PVC Pipe Using Solvent Cement³

D2737 Specification for Polyethylene (PE) Plastic Tubing³

D2740 Specification for Poly(Vinyl Chloride) (PVC) Plastic Tubing³

2.1.2 Joining Materials:

D2235 Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings²

D2464 Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80¹

D2465 Specification for Threaded Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80²

D2466 Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40²

D2467 Specification for Socket-Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80¹

D2468 Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40²

D2469 Specification for Socket-Type Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80²

¹ This recommended practice is under the jurisdiction of ASTM Committee F17 on Plastic Piping Systems and is the direct responsibility of Subcommittee F17.6.1 on Water Pipe.

Current edition approved Nov. 20, 1972. Published February 1973. Originally published as D 2774 - 69 T. Last previous edition D 2774 - 69 T.

² Discontinued, see 1986 Annual Book of ASTM Standards, Vol. 08.04.

³ Annual Book of ASTM Standards, Vol. 08.04.

D 2774

- D 2560 Specification for Solvent Cements for Cellulose Acetate Butyrate (CAB) Plastic Pipe, Tubing, and Fittings¹
- D 2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings¹
- D 2610 Specification for Butt Fusion Polyethylene (PE) Plastic Pipe Fittings, Schedule 40¹
- D 2611 Specification for Butt Fusion Polyethylene (PE) Plastic Pipe Fittings, Schedule 80¹
- D 2657 Practice for Heat-Joining Polyolefin Pipe and Fittings¹
- D 2683 Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing¹
- 2.1.3 *End Use Specification:*
- D 2513 Specification for Thermoplastic Gas Pressure Piping Systems¹
- 2.1.4 *Miscellaneous:*
- D 1598 Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure¹
- D 1599 Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings¹
- D 2122 Method of Determining Dimensions of Thermoplastic Pipe and Fittings¹
- D 2152 Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion¹
- D 2444 Test Method for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)¹

3. Joining

3.1 Plastic pipe may be joined together or to other pipes of dissimilar material using a number of different techniques. The technique used must be suitable for the particular pipes being joined to one another. Manufacturers should be consulted for specific instructions not covered by existing specifications. When requesting information, the intended service application should be made known.

3.2 Skill and knowledge on the part of the operator are required using recommended techniques to obtain quality joints. Training of new operators should be made under the guidance of skilled operators.

3.3 Joining specifications are listed under 2.1.2 of this recommended practice.

4. Trenching

4.1 *Trench Contour*—The trench bottom should be continuous, relatively smooth, and free of rocks. Where ledge rock, hardpan or boulders are encountered, it is advisable to pad the trench bottom using sand or compacted fine grained soils.

4.2 *Trench Width*—The width of the trench at any point below the top of the pipe should be sufficient to provide adequate room for: (1) joining the pipe in the ditch, if this is required; (2) snaking a pipe from side-to-side along the bottom of the ditch, if recommended by the pipe manufacturers; and (3) filling and compacting the side fills. Minimum

trench widths may be utilized with most pressure pipe materials by joining the pipe outside the trench and lowering into the trench after adequate joint strength has been obtained.

4.3 *Trench Depth and Pipe Cover*—Soil conditions, pipe size and necessary cover determine trench depth. Sufficient cover must be maintained to keep external stress levels below acceptable design stresses.² Reliability and safety of service may assume major importance in determining minimum cover for any intended service. Local, state or national codes may also govern. Pipe intended for potable water service should be buried at least 305 mm (12 in.) below maximum expected frost penetration. A minimum cover of 609 mm (24 in.) is considered desirable for pipe subject to heavy overhead traffic. In areas of light overhead traffic a cover of 305 to 457 mm (12 to 18 in.) is usually considered sufficient.

5. General Requirements for Bedding and Backfill

5.1 The pipe should be uniformly and continuously supported over its entire length on firm stable material. Blocking should not be used to change pipe grade or to intermittently support pipe across excavated sections.

5.2 Pipe is installed in a wide range of subsoils. These soils should be not only stable but also applied in such a manner as to physically shield the pipe from damage. Attention should be given to local pipe laying experience which may indicate solutions to particular pipe bedding problems.

5.3 Backfill materials according to the requirements of "Soil Types" (see Appendix X1) with a particle size of 12.7 mm (½ in.) or less should be used to surround the pipe. It should be placed in layers. Each soil layer should be sufficiently compacted to uniformly develop lateral passive soil forces during the backfill operation. It may be advisable to have the pipe under pressure.

5.4 Effects of ground freezing should be considered when pipe is installed at depths subject to frost penetration.

5.5 Vibratory methods are preferred when compacting sand or gravels. Best results are obtained when the soils are in a nearly saturated condition. Where water flooding is used, the initial backfill should be sufficient to ensure complete coverage of the pipe. Additional material should not be added until the water flooded backfill is firm enough to walk on. Care should be taken to avoid floating the pipe.

5.6 Sand and gravel containing a significant proportion of fine-grained material, such as silt and clay, should be compacted by hand or, preferably, by mechanical tamper.

5.7 The remainder of the backfill should be placed and spread in approximately uniform layers in such a manner as to fill the trench completely so that there will be no unfilled spaces under or about rocks or lumps of earth in the backfill. Large rocks, frozen clods and other debris greater than 76 mm (3 in.) in diameter should be removed. Rolling equipment or heavy tampers should only be used to consolidate the final backfill.

² Spangler, M. G., "Secondary Stresses in Buried Pressure Lines," The Iowa State College Bulletin, Engineering Report 23 of the Iowa Engineering Experiment Station, 1954 to 1955.

¹ Discontinued, see 1977 Annual Book of ASTM Standards, Part 34.

 D 2774

6. Installation Precautions

6.1 Plastic pipe should be stored so as to prevent damage by crushing or piercing. If stored at any length of time, it should be under cover and not in direct sunlight in accordance with the manufacturer's recommendations.

6.2 Care should be taken to protect the pipe from excessive heat or harmful chemicals. Cleaning solutions, detergents, solvents, etc., should be used with caution.

6.3 Pipe may be bent to a minimum radius recommended by the manufacturer for the kind, type, grade, wall thickness, and diameter of a specified pipe. Otherwise changes in direction should be made using suitable fittings.

6.4 Pipe joined using solvent cementing techniques should not be handled or installed in the ditch until after the joints are sufficiently "cured" to prevent weakening the joint.

6.5 During pipe lowering in operations, care should be taken to avoid imposing strains that will overstress or buckle the piping or impose excessive stress on the joints.

6.6 When ditched pipe has been assembled on top of the ditch, it is advisable to cool the pipe to ground temperature before backfilling to prevent pull out due to thermal contraction.

6.7 Suitable anchoring methods should be used to prevent excessive longitudinal or bending movement of the piping.

APPENDICES

(Nonmandatory Information)

X1. SOIL TYPES

X1.1 A soil is considered stable if it provides dependable support to the pipe and undergoes only slight volume change with variation in its moisture content. The ability of a soil to provide support depends upon its resistance to consolidation and its shear strength. In general, coarse grained soils are considered stable; in the United Soil Classification these are defined as soils of which 50 percent or less pass U.S. Standard No. 200 sieve.

NOTE X1—The particle passing through No. 200 sieve is about the smallest size visible to the naked eye.

X1.2 Using the group symbols of the Unified Soil Classification (Appendix X3) the following are considered stable backfill: GW, GP, GM, GC, SW Sp, provided that maximum particle size is not greater than 12.7 mm (1/2 in.).

X1.3 In terms of all over-all use, gravel with fines and sand are the best backfill materials for pressure pipe. Sand or gravel mixed with silts or clays, in which the sand or gravel constitute at least 50 percent of the mixture, are also suitable. Certain soils should not be used as backfill material; these include organic soils, identified by odor or spongy feel, and fat, highly plastic expansive clay. Frozen soil should not be placed in contact with the pipe.

X2. FIELD IDENTIFICATION OF SOILS

X2.1 *Gravel*—Minimum grain size 6.4 mm (1/4 in.).
X2.2 *Sand*—Individual grains visible to the naked eye with maximum particle size about 6.4 mm (0.25 in.). Fine sands display dilatancy and are nonplastic.

NOTE X2—To test for dilatancy, place a pat of moist soil on the palm of the hand. If the soil displays dilatancy, water will appear at the surface of the pat on shaking and disappear when the pat is compressed by the fingers.

X2.3 *Silt*—Individual grains difficult to see with the naked eye. May be slightly plastic. Displays dilatancy. Easily

washed from fingers. Low dry-strength.

X2.4 *Lean Clay*—Individual grains difficult to see with the naked eye. Dry lumps have moderate to high strength. Can be rolled into a 3.2-mm (1/8-in.) thread having low to moderate strength. Does not display dilatancy.

X2.5 *Fat Clay*—Shows no or very slow dilatancy and should not be used unless mixed with coarse grained material. Has high dry-strength. Has soapy feel and shiny streak results if fingernail is run over damp surface. Can be rolled into 3.2-mm (1/8-in.) threads having relatively high strength.

X3. UNIFIED SOIL CLASSIFICATION—GROUP SYMBOLS

GW—Well-graded gravels, gravel-sand mixtures, little or no fines.

GP—Poorly graded gravels, gravel-sand mixtures, little or no fines

GM—Silty gravels, poorly graded gravel-sand-silt mixtures.

GC—Clayey gravels, poorly graded gravel-sand-clay mixtures.

SW—Well-graded sands, gravelly sands, little or no fines.

SP—Poorly graded sands, gravelly sands, little or no fines.

SM—Silty sands, poorly graded sand-silt mixtures.

A-84.40 ASTM F402. The following is a partial reprint of excerpts from ASTM F402-80, Practice for Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings.



Designation: F 402 - 80

An American National Standard

Standard Practice for Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe and Fittings¹

This standard is issued under the fixed designation F 402; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscripted epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers procedures for safe handling of solvent cements and primers used in joining thermoplastic pipe and fittings. The procedures are general ones and include safeguards against hazards of fire and precautions for protection of personnel from breathing of vapors and contact with skin or eyes.

2. Referenced Documents

2.1 ASTM Standards:

- D 2235 Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings²
- D 2560 Specification for Solvent Cements for Cellulose Acetate Butyrate (CAB) Plastic Pipe, Tubing and Fittings²
- D 2564 Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings²
- D 2846 Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems²
- D 2855 Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings²
- D 3122 Specification for Solvent Cements for Styrene-Rubber Plastic Pipe and Fittings²
- D 3138 Specification for Solvent Cements for Transition Joints Between Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Non-Pressure Piping Components²
- F 493 Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride), (CPVC) Plastic Pipe and Fittings²
- F 545 Specification for PVC and ABS Injected Solvent Cemented Plastic Pipe Joints²

3. Definition

3.1 *solvent cement*—an adhesive made by dissolving a plastic resin or compound in a suitable solvent or mixture of solvents. The solvent cement dissolves the surfaces of the pipe and fittings to form a bond between the mating surfaces provided the proper cement is used for the particular materials and proper techniques are followed.

3.2 *primer*—an organic solvent, or blend of solvents, which enhances adhesion, applied to plastic pipe and fittings prior to application of a solvent cement.

4. Safety

4.1 A number of the solvents contained in primers and solvent cements are classified as airborne contaminants and flammable and combustible liquids. These primers and solvent cements generally are composed of solvent blends which vary with manufacturers. Follow precautions given herein to prevent fire and injury to personnel. Specific safety information on a particular solvent cement or primer may be found in the Material Safety Data supplied by the manufacturer.

4.2 Avoid prolonged breathing of solvent vapors. When pipe and fittings are being joined in partially enclosed areas, use a ventilating device in such a manner as to maintain a safe level of vapor concentration with respect to toxicity (1 and 3)³ and flammability (5) in the breathing area. Select ventilating devices and locate them so as not to provide a source of ignition to flammable vapor mixtures.

4.3 Keep solvent cements away from all sources of ignition, heat, sparks, and open flame (5).

4.4 Keep containers for solvent cements and primers tightly closed except when the product is being used. The container type shall be in accordance with Parts 1 to 199, Title 49—Transportation, Code of Federal Regulations. Container labeling shall conform with the requirements of the Federal Hazardous Substance Act as amended.

4.5 Dispose of all rags and other materials used for mopping up spills in a safety waste receptacle. Empty the receptacle daily with proper consideration for the flammable and toxic contents.

4.6 Most of the solvents used in pipe cements and primers can be considered eye irritants and contact with the eye should be avoided as it may cause eye injury. Proper eye protection and the use of chemical goggles or face shields is advisable where the possibility of splashing exists in handling solvent cements or primers. In case of eye contact, flush with plenty of water for 15 min and call a physician immediately.

4.7 Avoid contact with the skin. Wear proper gloves impervious to and unaffected by the solvents when contact with the skin is likely. Application of the primers or solvent cements with rags and bare hands is not recommended. Brushes and other suitable applicators can be used effectively for applying the solvent cement or primers, thus avoiding skin contact. Dispose of used applicators in the same manner as the rags (see 4.5). In the event of contact, remove contaminated clothing immediately and wash skin with soap and water. Ensure that contaminated clothing is free of flammable and toxic materials before wearing them again.

¹ This practice is under the jurisdiction of ASTM Committee F-17 on Plastic Piping Systems, and is the direct responsibility of Subcommittee F17.20 on Joining.

Current edition approved May 30, 1980. Published September 1980. Originally published as F 402 - 74. Last previous edition, F 402 - 74.

² Annual Book of ASTM Standards, Vol 08.04.

³ The boldface number in parenthesis refers to the list of references at the end of this practice.



F 402

REFERENCES

- 1) *Threshold Limit Values of Airborne Contaminants*, issued annually American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio.
- 2) *Hygienic Guide Series*, American Industrial Hygiene Assn., Akron, Ohio, AIHAA. Booklets on Cyclohexanone, Dimethylformamide, Methyl Ethyl Ketone, and Tetrahydrofuran.
- 3) Occupational Safety and Health Standards Federal Register Title 29, Part 1910.
- 4) *Handbook of Chemistry*, Lange, N. A., editor, Eleventh Ed., McGraw-Hill Book Company, Inc., New York, NY, 1973.
- 5) "Flammable Liquids," *National Fire Codes NFCA*, issued annually, "Flammable Liquids," National Fire Protection Association.
- 6) *Dangerous Properties of Industrial Materials*, Sax, Fifth Ed. Van Nostrand Reinhold Co., New York, NY, 1979.
- 7) *Clinical Toxicology of Commercial Products*, Fourth Ed., Williams and Wilkins Co., Baltimore, MD, 1976.

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 1916 Race St., Philadelphia, PA 19103.