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Providing Initial and Continuing Education Hours To The Wisconsin Construction Trades

COURSE 13908

Plumbing Design, Lead, Construction and Installation Trenching and Excavations

Review Material

Uscontractorlicense LLC

PO Box 268 / Platteville, Wisconsin 53818 / 608.348.6688 / www.uscontractorlicense.com

Summary Of This Course

PLUMBING DESIGN, CONSTRUCTION & INSTALLATION; LEAD; TRENCHING & EXCAVATIONS

Approved by the

Wisconsin Department of Safety and Professional Services Safety and Buildings Division

Course Identification Number 13908

Educational Credit Hours: Various Hours (See Below)

Course Provider:

USCONTRACTORLICENSE LLC

P.O. Box 268

Platteville, WI 53818

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This course is broken out into three sections and is intended to familiarize those involved in the plumbing trades with the current codes and regulations:

1. Plumbing Design, Construction and Installation (SPS 382) Review of the current plumbing codes.

2. Lead in Construction (OSHA)
Overview of the OSHA Lead Standards for construction.

3. Trenching and Excavations (OSHA)
Overview of the OSHA Trenching and Excavation Rule.

This Course is approved for the following Registrations/Certifications or Licenses:

Commercial Plumbing Inspector	12 Hours of Continuing Education	
Journeyman Plumber	12 Hours of Continuing Education	
Journeyman Plumber Restricted Appliance	9 Hours of Continuing Education	
Journeyman Plumber Restricted Service	3 Hours of Continuing Education	
Master Plumber	12 Hours of Continuing Education	
Master Plumber Restricted Appliance	9 Hours of Continuing Education	
UDC Plumbing Inspector	12 Hours of Continuing Education	
Utility Contractor	3 Hours of Continuing Education	
Master Plumber Restricted Service	3 Hours of Continuing Education	

Course Outline

This course is a distance learning or e-learning course, which allows the attendee to complete the course on their time schedule.

SPS 382 Design, Construction and Installation

- Scope
- Intent and Basic Requirements
- Administration and Enforcement
- Drain and Vent Systems

Lead In Construction

- OSHA Introduction
  - Health Hazards of Lead Exposure
  - Symptoms of Chronic Overexposure
- Reproductive Risks
- Chelating Agents
- Worker Exposure

- Construction Workers and Lead Exposure
  - Most Vulnerable Workers
  - OSHA's Lead Standard
  - Exposure Limits
  - Applicability to Construction

- Employer Responsibilities
  - Elements of a Compliance Program
  - Initial Employee Exposure Assessment
  - Biological Monitoring Tests
  - Pending Employee Exposure Assessment
  - Test Results Showing No Overexposures
  - Employee Notification of Monitoring Results

- Medical Exams
  - Medical Surveillance
  - Information for the Examining Physician
  - When Monitoring Shows No Employee Exposures
  - After the Medical Examinations
  - Medical Removal Provisions

- Worker Protections and Benefits
  - Records Requirements Involving Medical Removal
- Recordkeeping
  - Employer Requirements
  - Exposure Assessment Records
  - Medical Surveillance Records
  - Documents for Employees Subject to Medical Removal
  - Employer Requirements Related to Objective Data
  - Documents for OSHA and NOISH Review
  - When Closing a Business

Exposure Reduction and Employee Protection
- Engineering Controls
- Exhaust Ventilation
- Enclosure or Encapsulation
- Substitution
- Component Replacement
- Process or Equipment Modification
- Isolation

Housekeeping Practices
- Personal Hygiene Practices
- Change Areas
- Showers and Washing Facilities
- Personal Practices
- End-Of-Day Procedures

Protective Clothing and Equipment
- Employer Requirements
- Handling Contaminated Protective Clothing
- Preventing Heat Stress
- Respiratory Protection
- Providing Adequate Respiratory Protection
- Respiratory Protection Programs
- Selecting a Respirator

Employee Information and Training
- Program Requirements
- Warning Signs

OSHA Assistance, Services and Products
- State Programs

Consultation Assistance
Safety and Health Achievement Recognition Program
Voluntary Protection Programs
Cooperative Partnerships
Alliance Program
Strategic Partnership Program
Occupational Safety and Health Training
- Training Grants
- Other Assistance Materials
- In Case of an Emergency Or To File A Complaint
  - OSHA Regional Offices
  - Blood Lead Laboratories-Wisconsin

<u>Trenches and Excavations</u>

Working Safely in Trenches
- Dangers of Trenching and Evacuation
- Protect Yourself

- Protective Systems
- Competent Person
- Access and Egress
- General Trenching and Excavation Rules

Excavations
- Introduction
- Difference between Excavation and Trench
- Dangers
- OSHA Standard Rule
- Exemptions

PrePlanning
- Why is it important?
- Utility Lines and Pipes
- Informing Workers

Protective Systems
- Preventing Cave-ins
- Most appropriate Protective System Design
- Other Safety Precautions
- Installation and Removal of Protective Systems

Additional Hazards and Protections
- Warning Systems
- Water Accumulation
- Hazardous Atmospheres
- Means of Egress
- Pier Holes
- Site Inspection

OSHA Assistance, Services and Programs
- State Plans
  - Consultation Assistance
    - Privacy
    - Cost
    - Violations
    - Voluntary Protection Programs
    - Strategic Partnership Program
- OSHA Training for Employers and Employees
  - Training Grants
- Contact OSHA

Exam

200 questions related to the reference materials are used to test the attendee on their comprehension of the materials. A 70% score will need to be attained in order to pass this course.

Answer Sheet(s)

2 bubble style answer sheet(s) are included. When you are finished with the exam, you may return the answer sheets for grading to:

By Mail: Uscontractorlicense LLC
PO Box 268
Platteville, Wisconsin 53818

By Email: michael@uscontractorlicense.com

By Fax: 608-571-0096

Once we get the answer sheets back, we will graded them, enter your hours into the attendance portal and email or mail you back your certificate of completion(s). You will be responsible for renewing your license with the DSPS at www.license.wi.gov website.

Any questions, please contact us at 608.348.6688

Chapter SPS 382

DESIGN, CONSTRUCTION, INSTALLATION, SUPERVISION, MAINTENANCE AND INSPECTION OF PLUMBING

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. Chapter ILHR 82 was renumbered chapter Comm 82 under s. 13.93 (2m) (b) 1., Stats. and corrections made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1997, No. 494. Chapter Comm 82 was renumbered chapter SPS 382 under s. 13.92 (4) (b) 1., Stats., Register December 2011 No. 672.

SPS 382.01 Scope. The provisions of this chapter apply uniformly to the design, construction, installation, supervision, maintenance and inspection of plumbing, including but not limited to sanitary and storm drainage, water supplies, wastewater treatment, and dispersal or discharge for buildings, except for POWTS systems as regulated by ch. SPS 383.

History: Cr. Register, February, 1985, No. 350, eff. 3−1−85; CR 02−002: am. Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. Register January 2004 No. 576, eff. 2−1−04; correction made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.015 Purpose. Pursuant to s. 145.02, Stats., the purpose of this chapter is to provide that all plumbing in connection with buildings and facilities in the state, including buildings owned by the state or any political subdivision thereof, shall be safe, sanitary and such as to safeguard the public health and the waters of the state.

History: CR 02−002: cr. Register April 2003 No. 568, eff. 5−1−03.

SPS 382.03 Application. (1) The provisions of this chapter are not retroactive, unless specifically stated otherwise in the rule.

(2) Pursuant to s. 145.13, Stats., this chapter is uniform in application and a municipality may not enact an ordinance for the design, construction, installation, supervision, maintenance and inspection of plumbing which is more stringent than this chapter, except as specifically permitted by rule.

(3) A department interpretation of the requirements in this chapter shall supersede any differing interpretation by a lower level jurisdiction. A department decision on the application of the requirements in this chapter shall supersede any differing decision by a lower level jurisdiction.

Note: A decision of the department may be appealed. Section 101.02 (6) (e), Stats., outlines the procedure for submitting requests to the department for appeal hearings and the department procedures for hearing appeals.

History: Cr. Register, February, 1985, No. 350, eff. 3−1−85; CR 02−002: renum. to be (1), cr. (2) Register April 2003 No. 568, eff. 5−1−03; CR 07−100: cr. (3) Register September 2008 No. 633, eff. 10−1−08.

Subchapter I — Intent and Basic Requirements

SPS 382.10 Basic plumbing principles. This chapter is founded upon 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. As interpretations may be required and as unforeseen situations arise which are not specifically addressed, the following intent statements and basic requirements shall be used to evaluate equivalency where applicable:

(1) INTENT. (a) Plumbing in connection with 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 and the waters of the state.

(b) 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 the fixtures, appliances and appurtenances 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.

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

(d) Drain systems shall be designed, constructed and maintained so as to conduct the wastewater or sewage efficiently and shall have adequate cleanouts.

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

(f) A plumbing system shall be of durable material, free from defective workmanship, and designed and constructed so as to provide satisfactory service for its reasonable expected life.

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

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

(2) BASIC REQUIREMENTS. (a) Every building intended for human occupancy shall be provided with an adequate, safe and potable water supply.

(b) To fulfill the basic needs of sanitation and personal hygiene, each dwelling connected to a POWTS or public sewer shall be provided with at least the following plumbing fixtures: one water closet, one wash basin, one kitchen sink and one bathtub or shower, except a system or device recognized under ch. SPS 391 may be substituted for the water closet. All other structures for human occupancy shall be equipped with sanitary facilities in sufficient numbers as specified in chs. SPS 361 to 366.

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

(d) Where plumbing fixtures exist in a building that is not connected to a public sewer system, suitable provision shall be made for treating, recycling, dispersing or holding the wastewater.

(e) Plumbing fixtures shall be made of durable, smooth, non−absorbent and corrosion resistant material, and shall be free from concealed fouling surfaces.

History: Cr. Register, February, 1985, No. 350, eff. 3−1−85; correction in (3) made under s. 13.93 (2m) (b) 7., Stats; am. (2), Register, August, 1991, No. 428, eff. 9−1−91; am. (3), Register, March, 1992, No. 435, eff. 4−1−92; r. (7) and renum. (8) to (15) to be (7) to (14), Register, February, 2000, No. 530, eff. 3−1−00; am. (2), (7) and (12), r. and recr. (3) and r. (14), Register, April, 2000, No. 532, eff. 7−1−00; CR 01−139: am. (3) Register June 2002 No. 558, eff. 7−1−02; CR 02−002: r. and recr. Register April 2003 No. 568, eff. 5−1−03; correction in (2) (b) made under s. 13.92 (4) (b) 7., Stats., Register February 2008 No. 626; correction in (2) (b) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter II — Administration and Enforcement

SPS 382.20 Plan review and cross connection control assembly registration. (1) GENERAL. Plans and specifications shall be submitted to the department or to an approved agent municipality for review in accordance with pars. (a) and (b).

Note: The Department forms required in this chapter are available from the Division of Industry Services at P.O. Box 7162, Madison, WI 53707−7162; or at telephone (608) 266−2112 or (877) 617−1565 or 411 (Telecommunications Relay); or at the Division's Web site at http://dsps.wi.gov/programs/industry−services.

(a) *Department review.* Plumbing plans and specifications for the types of plumbing installations, except direct replacements, listed in Table 382.20−1 shall be submitted to the department for review, regardless of where the installation is to be located. 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.

(b) *Department or agent municipality review.* 1. Plumbing plans and specifications for the types of plumbing installations, except direct replacements, listed in Table 382.20−2 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.

Note: For a listing of agent municipalities, see ch. SPS 382 Appendix A−382.20 (2).

Note: The number of plumbing fixtures to be submitted and reviewed by an agent municipality is a subject of local ordinances.

2. 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. SPS 320.09.

(c) *Cross connection control assembly registration.* The installation of each reduced pressure principle backflow preventer, reduced pressure fire protection principle backflow preventer, spill resistant vacuum breaker, reduced pressure detector fire protection backflow prevention assembly or pressure vacuum breaker shall be registered with the department no later than 7 days after installation of the assembly.

Table 382.20−1

Submittals To Department

Type of Plumbing Installation
1. All plumbing, new installations, additions and alterations, regardless of the number of plumbing fixtures involved, serving hospitals, nursing homes and ambulatory surgery centers.[a]
2. Plumbing, new installations, additions and alterations involving 16 or more plumbing fixtures, serving buildings owned by a metropolitan or sanitary sewer district.[b]
3. Plumbing, new installations, additions and alterations involving 16 or more plumbing fixtures, serving buildings owned by the state.[b]
4. Alternate and experimental plumbing systems.
5. Reduced pressure principle backflow preventers, reduced pressure fire protection principle backflow preventers, pressure vacuum breaker assemblies, reduced pressure detector fire protection backflow prevention assemblies, and spill resistant vacuum breakers serving health care and related facilities.
6. Stormwater and clearwater infiltration plumbing systems serving a public building or facility.[c]
7. Treatment systems, other than POWTS, designed to treat water for compliance with Table 382.70−1.[c]

[a] The registration of cross connection control devices as required under s. SPS 382.20 (1) (c) is included as a part of plan review and approval.

[b] For the purpose of plan review submittal, water heaters, floor drains, storm inlets, roof drains, multi−purpose piping (mpp) fire sprinklers and hose bibbs are to be included in the count.

c Agent municipalities may perform this review when so authorized by the department.

Table 382.20−2

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 16 or more plumbing fixtures to be installed in connection with public buildings.[a,b]
2. Grease interceptors to be installed for public buildings.
3. Garage catch basins, carwash interceptors and oil interceptors to be installed for public buildings and facilities.
4. Sanitary dump stations.
5. Piping designed to serve as private water mains.
6. Water supply systems and drain systems to be installed for manufactured home communities and campgrounds.[c]
7. Piping designed to serve as private interceptor main sewers greater than 4 inches in diameter when sized for gravity flow.
8. Chemical waste systems regardless of the number of plumbing fixtures.[c]
9. Stormwater systems, not including infiltration plumbing systems, serving a public building or facility where the drainage area is one acre or more.[d]
10. Mixed wastewater holding device.

[a] For the purposes of plan review submittal, water heaters, floor drains, storm inlets, roof drains, multi−purpose piping (MPP) fire sprinklers and hose bibbs are to be included in the count. For a phased project such as a mall or office complex fixture count includes all proposed fixtures connected to a common building sanitary sewer, a common water service and all storm sewers serving the building.

[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.

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

[d] Plan review involving 16 or more plumbing fixtures also applies.

(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 utilize a plumbing inspector qualified by the department to conduct plumbing inspection and plan review at a staffing level based on local need.

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: For a listing of agent municipalities, see Appendix A−382.20 (2) or http://dsps.wi.gov/Documents/Industry%20Services/Forms/Plan%20Review/Industry%20Services%20Division%20Plumbing%20Agent%20Municipalities.pdf.

(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 plans in less than the normal processing time. Complete plans along with the fee specified in s. SPS 302.09, shall be submitted to the department. The plans shall comply with all of the provisions of this section.

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

(b) All plans submitted for approval shall be accompanied by sufficient data and information for the department to determine if the installation and its performance will meet the requirements of chs. SPS 381 to 384.

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

2. Plans proposing the installation, creation or extension of a sanitary 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.

Note: For plans proposing the installation, creation or extension of a private interceptor main sewer which is to discharge to a municipal treatment facility, see also ch. NR 121.

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 water 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 the proposed installation does not exceed the capacity of the existing building sewer or sewers; or

b. The plans indicate that a drainage load of not more than 54 drainage fixture units will be discharged through the building sewer.

Note: See ch. SPS 382 Appendix for listing of water quality management agencies.

(c) Plumbing plans, index sheets and specifications for a plumbing system submitted for review and approval shall be signed in accordance with any of the following methods:

1. A Wisconsin registered architect, engineer or plumbing designer shall sign and seal or stamp all plans and accompanying specifications in accordance with ch. A−E 2.

2. A master plumber, master plumber−restricted service, master plumber−restricted appliance or a utility contractor shall sign and date all plumbing plans and accompanying specifications as provided under s. 145.06, Stats. Each sheet of plans and specifications submitted shall be signed and dated and shall include the valid Wisconsin license number of the individual responsible for the installation. Where more than one sheet is bound together into one volume, only the title sheet or index sheet shall be signed and dated by the individual responsible for the installation. The signed title or index sheet shall clearly identify all of the other sheets in the volume.

3. A pump installer shall sign and date all plumbing plans and accompanying specifications for which the individual is responsible for the installation. Each sheet of plans and specifications submitted shall be signed and dated and shall include the valid Wisconsin license number of the individual responsible for the installation. Where more than one sheet is bound together into one volume, only the title sheet or index sheet shall be signed and dated by the individual responsible for the installation. The signed title or index sheet shall clearly identify all of the other sheets in the volume.

(d) 1. When requesting approval of an experimental plumbing system, all of the following shall be submitted:

a. At least 2 sets of plans signed in accordance with par. (d) and detailing the system installation for each site.

b. A letter of consent from the site or system owner of the installation. The letter shall acknowledge that the owner has received and read a copy of the experimental plumbing system submittal and is in agreement with all requirements listed within this subdivision.

c. Any additional information as requested by the department.

2. The registered architect, engineer, designer or master plumber responsible for the design of the experimental plumbing system shall, upon completion, certify in writing to the department that the installation is in compliance with the approved plans, specifications and data.

3. Onsite inspections shall be performed by the department at time intervals as specified by the department, but not less than once a year. Time intervals shall be included as conditions of approval. An inspection report shall be written. The department may assess a fee for each inspection.

Note: Refer to ch. SPS 302 for applicable fees.

4. No later than five years after the date of the completed installation the department may perform one of the following:

a. Order the removal of the experimental plumbing system.

b. Issue an alternate approval as specified in sub. (12) (a).

c. Provide an extension of the experiment with conditions.

5. If an experimental plumbing system is subsequently codified in chs. SPS 382 and 384, or ch. 145, Stats., the requirements as specified in subds. 3. and 4. do not apply.

(5) PLAN REVIEW. Except as provided in sub. (12), and pursuant to s. SPS 302.07 (3), the department shall review and make a determination on an application for plan review within 15 business days.

(a) *Conditional approval.* If, upon review, the department determines that the plans substantially conform to the provisions of chs. SPS 382 to 384, 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 plans do not substantially conform to the provisions of chs. SPS 382 to 384, 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 ss. SPS 302.64 and 302.52.

(8) REVISIONS. All changes or modifications, which involve the provisions of chs. SPS 382 to 384, 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 shall consider and may grant a variance to a provision of this chapter in accordance with ch. SPS 303.

Note: Chapter SPS 303 requires the submittal of a petition for variance form (SBD−9890) and a fee, and that an equivalency is established in the petition for variance that meets the intent of the rule being petitioned. Chapter SPS 303 also requires the department to process regular petitions within 30 business days and priority petitions within 10 business days.

Note: Form SBD−9890 is available from the Department's Division of Industry Services at P.O. Box 7162, Madison, WI 53707−7162; or at telephone (608) 266−2112 or (877) 617−1565 or 411 (Telecommunications Relay); or at the Division's Web site at http://dsps.wi.gov/programs/industry−services.

(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.

Note: Form SBD−9890 is available from the Department's Division of Industry Services at P.O. Box 7162, Madison, WI 53707−7162; or at telephone (608) 266−2112 or (877) 617−1565 or 411 (Telecommunications Relay); or at the Division's Web site at http://dsps.wi.gov/programs/industry−services.

(12) ALTERNATE AND EXPERIMENTAL PLUMBING SYSTEM REVIEW AND APPROVAL. The provisions of this chapter, ch. SPS 384 or ch. 145, Stats., are not intended to prevent the design and use of approved innovative plumbing systems.

(a) *Alternate plumbing systems.* The department may issue an approval of an alternate plumbing system if the system complies with the intent of chs. SPS 382 and 384, or ch. 145, Stats.

1. For an alternate plumbing system, before availability for statewide installation and use, an alternate plumbing system approval shall be issued. Concepts, plans, specifications and the documentation to support the system design shall be submitted to the department for review.

2. The department may require the submission of any information deemed necessary for review. Sufficient evidence shall be submitted to substantiate at least the following:

a. Assertions of function and performance.

b. Compliance with the intent of chs. SPS 382 and 384, or ch. 145, Stats.

3. Pursuant to s. SPS 302.07 (3), the department shall review and make a determination on an application for an alternate plumbing system within 3 months. Approval for an alternate plumbing system shall be issued by the department in writing.

4. The department may include specific conditions in issuing an approval for an alternate plumbing system, including an expiration date for the approval. A violation of any of the conditions under which an approval is issued shall constitute a violation of this chapter.

5. If upon review the department determines that an alternate plumbing system does not comply with the intent of chs. SPS 382 and 384, or ch. 145, Stats., the request for approval shall be denied in writing.

(b) *Experimental plumbing systems.* The department may issue an approval of an experimental plumbing system for the purpose of proving compliance with the intent of chs. SPS 382 and 384 and ch. 145, Stats.

1. For an experimental plumbing system, a separate approval shall be obtained for each system or project to be installed for the purpose of proving compliance with the intent of chs. SPS 382 and 384 and ch. 145, Stats. Approval for an experimental plumbing system shall be issued by the department in writing.

2. The department may require the submission of additional information deemed necessary for determining that the design meets the intent of chs. SPS 382 and 384 and ch. 145, Stats.

3. Pursuant to s. SPS 302.07 (3), the department shall review and make a determination on an application for an experimental plumbing system within 6 months.

4. The department may include specific conditions in issuing an approval for an experimental plumbing system, including an expiration date for the approval. A violation of any of the conditions under which an approval is issued shall constitute a violation of this chapter.

5. Denial of an experimental plumbing system or project by the department shall be made in writing.

6. The department may establish parameters to limit the number of applications for review it will accept for experimental plumbing systems.

(c) *Modification.* If an approved alternate or experimental plumbing system is modified or additional assertions of function or performance are made, the approval shall be void, unless the system is resubmitted to the department for review and approval is granted.

(d) *Revocation of approval.* The department may revoke an approval issued under this section for any false statements or misrepresentations of facts or data on which the approval was based, or as a result of system failure.

(e) *Limitations.* An approval issued by the department for an alternate or experimental plumbing system may not be construed as an assumption of any responsibility for defects in design, construction or performance of any system nor for any damages that may result.

(f) *Fees.* Fees for the review of an alternate or experimental plumbing system under this section and any onsite inspections shall be submitted in accordance with ch. SPS 302.

(13) CROSS CONNECTION CONTROL REGISTRATION. (a) Registration, as specified in sub. (1) (c), shall be submitted in a format acceptable to the department.

Note: The Department forms required in this chapter are available from the Division of Industry Services at P.O. Box 7162, Madison, WI 53707−7162; or at telephone (608) 266−2112 or (877) 617−1565 or 411 (Telecommunications Relay); or at the Division's Web site at http://dsps.wi.gov/programs/industry−services.

(b) The form for registering cross connection control devices and assemblies with the department shall include at least all of the following information:

1. The building or facility name and address where the device or assembly is or will be installed.

2. The location of the cross connection control device or assembly within the building or facility.

3. A description of the cross connection control device or assembly including the size, model number, serial number and manufacturer.

4. The name of the owner or owner's agent submitting the registration form and contact information.

(c) Each registration form submitted shall be accompanied by the appropriate fee in accordance with s. SPS 302.645.

(d) Upon receipt of a completed registration form, the department shall issue written confirmation of registration including a department assigned identification number for each cross connection control device or assembly.

(e) Upon permanent removal or replacement of any reduced pressure principle backflow preventer, reduced pressure fire protection principle backflow preventer, spill resistant vacuum breaker, reduced pressure detector fire protection backflow prevention assembly, or pressure vacuum breaker, the owner shall notify the department in writing using a format acceptable to the department.

(14) PENALTIES. Penalties for violations of this chapter shall be assessed in accordance with s. 145.12, 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; am. (4) (c) 2. intro. and 4. a. and b., Register, February, 1991, No. 422, eff. 3−1−91; am. (4) (c) 3.a., Register, August, 1991, No. 428, eff. 9−1−91; am. (1) (intro.), (a), (4) (a) to (c) 1., (5) (a), (b) and Tables 82.20−1 and 82.20−2, renum. (4) (d) and (e) to be (4) (d) 1. a. and b. and am. (4) (d) 1. a., cr. (4) (d) 2., Register, February, 1994, No. 458, eff. 3−1−94; correction in (7) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; am. Tables 82.20−1, 2, (1) (b) 2., Register, February, 1997, No. 494, eff. 3−1−97; correction in (13) made under s. 13.93 (2m) (b) 7., Stats., Register, February, 2000, No. 530; am. Tables 82.20−1 and 82.20−2, r. (4) (b), Register, July, 2000, No. 535, eff. 9−1−00; cr. (4) (e), r. and recr. (11) and (12), am. Table 82.20−1, Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: am. (1) (intro.) and Tables 82.20−1 and 82.20−2, r. and recr. (1) (a), r. (1) (b) 2. and (4) (d), renum. (1) (b) (intro.), and 1., (4) (c), (e) and (13) to be (1) (b) 1. and 2., (4) (b), (d) and (14) and am. (4) (b) (intro.) and 2. (intro.), cr. (1) (c), (4) (c) and (13) Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. (title), (1) (intro) and (c), and (13) (e) Register January 2004 No. 577, eff. 2−1−04; CR 04−035: am. Tables 82.20−1 and 82.20−2 Register November 2004 No. 587, eff. 12−1−04; CR 06−119: am. (5) (intro.), (12) (a) 3. and (b) 3. Register July 2007 No. 619, eff. 8−1−07; CR 08−055: am. (1) (c) (intro.), (4) (b) 2. (intro.), (13) (e), Tables 82.20−1 and 82.20−2 Register February 2009 No. 638, eff. 3−1−09; correction in (3) made under s. 13.92 (4) (b) 7., Stats., Register February 2009 No. 638; CR 09−050: am. (1) (intro.), (b) 1. and Table 82.20−2, r. and recr. (1) (a), (c) and Table 82.20−1 Register December 2009 No. 648, eff. 1−1−10; CR 10−064: am. Tables 82.20−1 and 82.20−2 Register December 2010 No. 660, eff. 1−1−11; correction in (1) (a), (b) 1., 2., (3), (4) (b), (d) 5., (5) (intro.), (a), (b), (7), (8), (11) (a), (12) (intro.), (a) (intro.), 2. b., 3., 5., (b) (intro.), 1., 2., 3., (f), (13) (c), Table 82.20−1 made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672; **CR 13−046: am. (2) (a) (intro.) Register December 2013 No. 696, eff. 1−1−14.**

SPS 382.21 Testing and inspection. (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 sub. (2) to disclose leaks and defects before the plumbing is put into operation.

(a) *Waiver of testing.* 1. 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.

2. a. Field testing the installation of a storm building sewer and a storm private interceptor main sewer is not required.

b. The joints and connections to be employed for storm building sewer piping shall conform with s. SPS 384.40 (1) (a).

(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. Except as permitted in par. (c), 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.

c. Testing may be done without the presence of the inspector, if the master plumber responsible for the installation obtains the inspector's permission to provide a written test report in a format acceptable to the inspector.

Note: See ch. SPS 382 Appendix for a sample affidavit form.

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. Municipalities may require that a final test be conducted in accordance with sub. (2) (h) and that the final test, when required by the municipality, 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. SPS 320.08 to 320.11.

(d) The initial testing of cross connection control assemblies shall comply with s. SPS 382.22 (8).

(2) TESTING PROVISIONS. (a) *General.* The testing of plumbing installations shall be conducted in accordance with this paragraph.

1. '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.

2. 'Exposure of work.' Except as provided in pars. (b) and (e), 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.

(b) *Sanitary building sewer and sanitary private interceptor main sewer.* A sanitary building sewer and a sanitary private interceptor main sewer shall be tested for leaks and defects with water or air before or after being covered in accordance with either subd. 1. or 2. The test for leaks and defects may be applied to the entire building sewer or private interceptor main sewer or in sections. For the purposes of this subdivision, the testing of a building sewer or private interceptor main sewer is not required to include the manholes serving the sewer.

1. 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.

2. 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.

(c) *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 par. (g).

(d) *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 par. (g).

(e) *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.

Note: Standard NFPA 24 for combination water services and combination private water mains may include more stringent requirements for testing.

(f) *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.

(g) *Test methods for drain and vent systems.* A test for water-tightness 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 subd. 1. or 2.

1. 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.

2. 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" in height. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

(h) *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 subd. 1. or 2.

1. 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.

2. The air test shall be made by attaching a gauge to any suitable opening and, after closing all other inlets and outlets in the system, adding air into the system until a pressure equivalent to a one inch water column exists. The pressure shall remain constant for at least a 5−minute test period without the introduction of additional air.

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**;** renum. (1) (a) and (2) (b) to (i) to be (1) (a) 1. and (2) (a) to (h), r. (2) (a), cr. (1) (a) 2. and (3), r. and recr. (1) (d) 1. (intro.), am. (1) (d) 2. (intro.), Register, February, 1994, No. 458, eff. 3−1−94**;** am. (3) (b) 3., Register, October, 1996, No. 490, eff. 11−1−96; am. (3), Register, February, 1997, No. 494, eff. 3−1−97; r. and recr. (2) (a) and (3), cr. Table 82.21−1, Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: r. and recr. (1) (b) 4. b. and (2) (d), am. (1) (d) 8. b. Register April 2003 No. 568, eff. 5−1−03; CR 04−035: am. Table 82.21−1 Register November 2004 No. 587, eff. 12−1−04; CR 08−055: am. (title) and (1) (intro.), r. and recr. (1) (b) 1. b., r. (2) and Table 82.21−1, renum. (1) (d) and (3) to be (2) and Comm 82.22 (9) Register February 2009 No. 638, eff. 3−1−09; corrections in (1) (b) 4. b., (2) (a) 2., (b) (intro.), (c), (d), (g) (intro.) and (h) (intro.) made under s. 13.92 (4) (b) 7., Stats., Register February 2009 No. 638; CR 10−064: renum. (1) (b) 1. b. to be (1) (b) 1. c., cr. (1) (b) 1. b., (d) Register December 2010 No. 660, eff. 1−1−11; correction in (1) (a) 2. b., (c), (d) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.22 Maintenance and repairs. (1) GENERAL. (a) All plumbing systems, both existing and new, and all parts thereof, shall be maintained in a safe and sanitary condition.

(b) All devices or safeguards that are required by this chapter shall be maintained in good working order.

(c) The owner shall maintain plumbing systems.

(2) EXISTING SYSTEMS. (a) Except as specified in par. (b), any existing plumbing system may remain and maintenance continue if the maintenance is in accordance with the original system design and any of the following:

1. The plumbing system was installed in accordance with the code in effect at the time of installation.

2. The plumbing system conforms to the present code.

(b) When a hazard to life, health or property exists or is created by an existing system, that system shall be repaired or replaced.

Note: A cross connection is considered a health hazard by the department.

(c) Existing sewers and water services may only be connected to new buildings when determined by examination and test to conform to the requirements of this chapter.

(3) FIXTURES REPLACED. (a) When a fixture, appliance or section of pipe is replaced, the replacement fixture, appliance or pipe shall conform to the provisions of this chapter.

(b) Where the existing drain or vent piping does not conform to the current provisions of this chapter, the department may require the new fixtures to be provided with deep seal traps.

(4) PLUMBING REUSED. (a) 1. Except as provided in par. (b) plumbing materials, fixtures or devices removed and found to be in good condition may be reused if such reuse is approved by the department or a local plumbing inspector.

2. The owner of the building or facility in which the reused materials are to be installed shall provide written consent.

(b) Water supply piping materials may only be reused when the intended use involves an equal or higher degree of hazard than the previous use as specified in Table 382.70–1.

(5) REPAIRS. All repairs to fixtures, devices or piping shall be completed in conformance with the provisions of this chapter, except repair clamps or bands may be used for emergency situations.

(6) 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.

(7) 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.

(8) TESTING OF CROSS CONNECTION CONTROL ASSEMBLIES. (a) The performance testing requirements of this subsection apply to all cross connection control assemblies regardless of date of installation.

Note: For further clarification see Table 382.22–1.

(b) 1. A performance test shall be conducted for the assemblies listed in Table 382.22–1 at all of the following intervals:

a. At the time of installation.

b. Immediately after repairs or alterations to the assembly have occurred.

c. At least annually.

2. The performance test shall be conducted using the appropriate test standard for the assembly as specified in Table 382.22–1.

3. A cross connection assembly performance test shall be conducted by an individual registered by the department in accordance with s. SPS 305.99.

4. a. The results of the cross connection control assembly performance test shall be submitted as specified in Table 382.22–1 in a format prescribed by the department accompanied by a filing fee as specified in s. SPS 302.645 (2).

b. As specified in Table 382.22–1, the results of the cross connection assembly performance test shall be submitted to the department and purveyor within 60 days of completion of the test.

5. The results of performance tests for the assemblies listed in Table 382.22–1 shall be made available upon request to the department, its agent or the local government unit.

Table 382.22−1
Testing And Submitting Requirements For Cross Connection Control Assemblies

ASSE Standard Name and Number	CAN/CSA Standard Name and Number	ASSE Test Standard Number and Test Required	Test Results to be Submitted to Department
Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies ASSE 1015	Double Check Valve Backflow Preventers CAN/CSA B64.5 and Double Check Valve Backflow Preventers For Fire Protection Systems CAN/CSA−B64.5.1	5015	No
Double Check Detector Fire Protection Backflow Prevention Assemblies ASSE 1048	_ _ _ _ _ _ _	5048	No
Pressure Vacuum Breaker Assembly ASSE 1020	Pressure Vacuum Breakers CAN/CSA−B64.1.2	5020	Yes
Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers ASSE 1013	Reduced Pressure Principle Backflow Preventers CAN/CSA B64.4 and Reduced Pressure Principle Backflow Preventers For Fire Protection Systems CAN/CSA−B64.4.1	5013	Yes
Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies ASSE 1047	_ _ _ _ _ _ _	5047	Yes
Spill Resistant Vacuum Breaker ASSE 1056	Spill Resistant Vacuum Breakers CAN/CSA B64.1.3	5056	Yes

History: CR 08−055: cr. (1) to (8) and Table 82.22−1, (9) renum. from Comm 82.21 (3) Register February 2009 No. 638, eff. 3−1−09; correction to numbering in (3) made under s. 13.92 (4) (b) 1., Stats., Register February 2009 No. 638; CR 09−050: am. (8) (b) 4. a. and Table 82.22−1, r. (9) Register December 2009 No. 648, eff. 1−1−10; correction in (4) (b), (8) (b) 1. (intro.), 2., 3., 4. a., b., 5. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter III — Drain and Vent Systems

SPS 382.30 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. SPS 382.36.

(2) MATERIALS. All sanitary drain systems shall be constructed of approved materials in accordance with ch. SPS 384.

(3) LOAD ON DRAIN PIPING. (a) *Intermittent flow.* 1. 'Fixture.' The load factor on drain piping shall be computed in terms of drainage fixture unit values specified in Table 382.30–1 for the corresponding listed fixture.

2. 'Devices.' Drainage fixture unit values for intermittent flow devices not listed in Table 382.30–1 shall be computed on the basis of one fixture unit equalling one gallon per minute of flow.

Note: Equipment with a timed discharge cycle(s) of 2 minutes or less may be considered as an intermittent flow device.

(b) *Continuous flow devices.* Drainage fixtures unit values for continuous flow devices such as pumps, ejectors, air conditioning equipment or similar devices that discharge continuously shall be computed on the basis of 2 fixture units for each one gallon per minute of flow.

(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 382.30−2 and 382.30−3.

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. SPS 382.31 (17) for sizing requirements of combination drain and vent systems.

Note: See ch. SPS 382 Appendix for further explanatory material.

(b) *Minimum size of building sewers.* 1. 'Gravity flow sewers.' The minimum size of a gravity flow sanitary building sewer shall be 4″ 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" 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" in diameter for sewage ejectors and sewage pumps, and 1¼" in diameter for all sewage grinder pumps.

(c) *Minimum size of private interceptor main sewers.* 1. Except as provided in subd. 3., the minimum size of a gravity flow private interceptor main sewer shall be 4" in diameter.

2. Except as provided in subd. 3., the minimum size of pressurized private interceptor main sewer shall be such so as to maintain a minimum flow velocity of 2 feet per second.

3. A municipality or a sanitary district may by ordinance, require the minimum size of a private interceptor main sewer to be larger than 4" in diameter.

4. Private interceptor main sewers 6" or less in diameter may not exceed the drainage fixture limits in Table 382.30−3.

5. Private interceptor main sewers 8" or larger in diameter shall conform with the design criteria specified in s. NR 110.13.

Note: See ch. SPS 382 Appendix A−382.30 (4) for further explanatory material.

(d) *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 382.30−1
Drainage Fixture Unit Values By Fixture Type

Type of Fixture	Drainage-Fixture UnitValue (dfu)	Trap Size Minimum Diameter (inches)
Automatic Clothes Washers:		
Commercial, individual	4	2
Commercial, large capacity	a	a
Self Service Laundry	4	2
Residential	4	2
Autopsy Table	h	h
Bathroom Group, includes: water closet, lavatory, bathtub or shower	6	
Bathtubs, all types[b]	2	1 1/2
Bedpan Washer	6	2
Beer Tap	1/2	1 1/4
Bidet	2	1 1/2
Bottle Cooler	1/2	1 1/4
Campsite Receptor	6	4
Coffee Maker	1/2	1 1/4
Cuspidor, fountain or dental	1	1 1/4
Dipper Well	1	1 1/4
Dishwasher, commercial type	c	c
Dishwasher, residential type	2	1 1/2
Drinking Fountain	1/2	1 1/4
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	1/2	1 1/4
Glass Washer	2	1 1/2
Health Care Fixtures:		
Clinic sink	6	NA
Exam/treatment sink	1	1 1/4
Sitz bath	2	1 1/2
Ice Chest	1/2	1 1/2
Laundry Tray, 1 or 2 compartment	2	1 1/2
Lavatory	1	1 1/4
Lavatory, combination per trap	1	1½
Manufactured Home	11	NA
Refrigerated Food Display Case	1	1
Shower Stall:		
Residential	2	2
Public, individual	2	2
Public, group	2 per shower head	2

Table 382.30−1
Drainage Fixture Unit Values By Fixture Type

Type of Fixture	Drainage-Fixture UnitValue (dfu)	Trap Size Minimum Diameter (inches)
Sinks:[i]		
Bar, residential	1	1¼
Breakroom (single compartment)	1	1 1/2
Cup	1/2	1 1/4
Factory, wash, per set of faucets	1	1 1/2
Fountain wash up	1	1 1/2
Fountain or Bar, 4 compartments or less	3	1 1/2
Food Waste Grinder, commercial 2 HP or less	2	f
Food Waste Grinder, commercial 3 HP or more	3	f
Laboratory	2	1 1/2
Laboratory, school	2	1 1/2
Classroom	1	1 1/4
Pack or plaster	3	2
Residential, with or without food waste grinder	2	1 1/2
Restaurant, Scullery, pots and pans — 4 compartments or less	3	f
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	1 1/2
Surgeons, wash up	3	1 1/2
Wash Fountain, circular and semi−circular	2	1 1/2
Receptors of Indirect Wastes, gravity flow discharge:		
1 1/4 inch receptor outlet diameter	1	1 1/4
1 1/2 inch receptor outlet diameter	2	1 1/2
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	1/2	1 1/4
Sterilizers:		
Bedpan	4	2
Garbage can washer	3	3
Instrument or water	1	
Urinal	2	g
Water Closet, nonpublic	4	g
Water Closet, public	6	g

NA = not applicable

[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″ diameter trap and drain pipe minimum recommended.

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

[f] Trap size corresponds to the size of the drain outlet.

[g] Trap size specified in referenced standards of s. SPS 384.20.

[h] Trap size corresponds to the size of the drain outlet. Use the dfu value of the receptor serving the autopsy table.

[i] Sinks not specified in this table shall be assigned 1 dfu for 1 1/4″ tailpiece, 2 dfu for 1 1/2″ tailpiece and 3 dfu for 2″ tailpiece.

Table 382.30−2
Stacks And Drain Piping

Pipe Diameter (inches)	Maximum Number of Drainage Fixture Units That May Drain Through Any Portion of Drain Piping[a]			
	Drain Piping Other Than Stacks[b]	Stacks[c]		
		Total Discharge from Side Connections into One Branch Interval[d,e]	Stacks of 3 Branch Intervals or Less	Stacks of More Than 3 Branch Intervals
1 ¼	1	1	2	2
1 ½	3	2	4	8
2	6	6	10	24
3	20	20	48	72
4	160	90	240	500
5	360	200	540	1,100
6	620	350	960	1,900
8	1,400	600	2,200	3,600
10	2,500	1,000	3,800	5,600
12	3,900	1,500	6,000	8,400
15	7,000	[f]	f	f

[a] Through any portion of a stack includes all of the flow at the design point.
[b] Does not include building drains and subdrains, building sewers, private interceptor main sewers and forced discharge piping.
[c] 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. SPS 382.31 (14) (a).
[d] Into one branch interval includes the discharge from the top fitting of the branch interval and does not include the discharge from the bottom most fitting creating the branch interval.
[e] Reduction in diameter may occur within a branch interval.
[f] Sizing based on design criteria.

Table 382.30−3
Building Drains, Building Subdrains, Building Sewers and Private Interceptor Main Sewers[a]

Pipe Diameter (inches)	Maximum Number of Drainage Fixture Units Which May Drain Through Any Portion of a Building Drain, Building Subdrain, Building Sewer or Private Interceptor Main Sewer			
	Pitch (inch per foot)			
	1/16	1/8	1/4	1/2
1 ¼	NP[b]	NP	1	1
1 ½	NP	NP	3	3
2	NP	NP	6	9
3	NP	36	42	50
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	3,900	4,600	5,600	6,700
15	7,000	8,300	10,000	12,000

[a] Private interceptor main sewers 6 inches or less in diameter, see s. NR 110.13 for private interceptor main sewers 8 inches or larger in diameter.
[b] NP means Not Permitted.

Note: For further explanatory material see ch. SPS 382 Appendix A−382.30 (4).

(5) PITCH OF HORIZONTAL DRAIN PIPING. All horizontal drain piping 4" 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" or less in diameter shall be $^1/_4$" per foot.

2. The minimum pitch of horizontal branch drains larger than 2″ in diameter shall be $^1/_8$" per foot.

(b) *Building drains and building sewers.* 1. The minimum pitch of building drains shall be in accordance with Table 382.30−3.

2. a. The minimum pitch of building sewers 10" or less in diameter shall be in accordance with Table 382.30−3.

b. The minimum pitch of building sewers 12" or larger in diameter shall conform with the minimum pitch specified for municipal sewers in s. NR 110.13.

Note: See also s. SPS 382.30 (4) (c) 5. for further explanatory material.

(c) *Private interceptor main sewers.* 1. The minimum pitch of private interceptor main sewers 6" or less in diameter shall be in accordance with Table 382.30−3.

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

Note: See ch. SPS 382 Appendix for further explanatory material.

(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. Except as provided in par. (c), where a horizontal branch connects to a drain 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 5 or more branch intervals below the top of the stack, the offset shall be vented in accordance with s. SPS 382.31 (5) (a).

(b) *Offsets of more than 45°.* Except as provided in par. (c), 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 drain stack above the highest offset 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 building 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.

4. Where an offset of more than 45º is located more than four branch intervals below the top of the drain stack, a horizontal branch may not connect within the offset or within 2 feet above or below such offset.

5. a. Except as exempted in subd. 5. b., or par. (c), where an offset in a drain stack with a change of more than 45° from vertical is located below 5 or more branch intervals, the offset shall be vented in accordance with s. SPS 382.31 (5) (b).

b. The vent required in subd. 5. a. shall not be required where the drain stack, including the offset, is sized one pipe size larger than required for a building drain designed to serve as per sub. (4) and the entire stack and offset are not less in cross sectional area than that required for a stack plus the area of a vent as required in s. SPS 382.31 (5) (b).

Note: See ch. SPS 382 Appendix for further explanatory material.

(c) *Exception.* Where an offset is located two or more feet below the lowest branch drain connection to the stack, the venting specified in this subsection and s. SPS 382.31 (5) (b) is not required.

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

(b) A building drain branch or building subdrain branch may not connect to a building drain or building subdrain downstream from the base fitting of a drain stack 2" or larger in diameter within the distance equal to 20 pipe diameters of the building drain or building subdrain.

Note: See ch. SPS 382 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″ or less in diameter shall conform to the minimum radii specified in Table 382.30−4.

Note: See ch. SPS 382 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" for drain piping 1−1/2" 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" for drain piping 3" in diameter.

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

Table 382.30−4

Minimum Radii of Fittings (in inches)

Diameter of pipe (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 x 3 inch closet bend or collar fitting from 4" to 3" 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.

(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. SPS 384.30 (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 wastewater by gravity flow, and shall be located at least 25 feet from any water well or as otherwise approved by the department of natural resources.

2. 'Capacity.' Except as provided in pars. (c) and (d), the minimum capacity of the sump shall be determined in accordance with the provisions of subd. 2. 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".

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

e. Sumps containing one pump shall have an inside diameter of at least 24". Sumps containing 2 pumps shall have an inside diameter of at least 30″.

Note: See ch. SPS 382 Appendix for further explanatory material.

3. 'Vents.' All sumps and all drains leading to a sump shall be vented in accordance with s. SPS 382.31.

4. 'Materials.' All sumps shall be constructed in a watertight manner of approved materials in accordance with ch. SPS 384.

5. 'Removable covers.' Penetrations through the top of removable sump covers shall be limited to those for the electrical supply, the vent piping and the discharge piping for the pump or pumps.

(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. 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. 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. 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.

d. Where duplex pumping equipment is installed, an audible or visual alarm system with a manual control reset shall be installed to indicate pump failure.

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: See ch. SPS 382 Appendix for velocity in relation to flow rate by various pipe sizes.

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

a. All sewage grinder pumps shall have a minimum $1^1/_4$" diameter discharge opening and discharge piping.

b. All nongrinder−type sewage pumps serving water closets shall be capable of passing a 2" diameter solid ball and shall have a minimum 2″ 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 $^1/_2$″ diameter solid ball and shall have a minimum $1^1/_4$" 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. With the exception of exterior sumps, 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.

(c) *Prefabricated pumps and sump systems.* The minimum capacity of a prefabricated pump and sump system shall be determined in accordance with all of the following:

1. The water supply fixture unit, wsfu, method shall be used to determine peak input flow in gallons per minute. The peak input shall include all the fixtures that drain to the sump.

2. Unless storage is provided as specified in par. (a) 2., the capacity of the prefabricated pump and sump system shall accommodate the peak input flow.

3. The low water level shall be maintained in accordance with the pump manufacturer's requirements.

(d) *Exterior sumps.* The minimum capacity of exterior sumps shall be determined in accordance with all of the following:

1. Peak input flow in gallons per minute shall be determined in accordance with either of the following:

a. The water supply fixture unit, wsfu, method of all the fixtures that drain to the sump.

b. The provisions as specified in s. SPS 383.43 (2) through (6).

2. In lieu of providing the duplex pumping equipment as specified in par. (b) 2., a one−day holding capacity may be provided above a high level alarm when installed on a simplex system.

(11) BUILDING DRAINS AND BUILDING SEWERS. (a) *Limitations.* No building sewer may pass through or under a building to serve another building, unless:

1. The building sewer serves farm buildings or farm houses, or both, which are all located on one property; or

2. The building sewer or private interceptor main sewer serves buildings located on the same property and a document, which indicates the piping and distribution arrangement for the property and buildings, shall be recorded with the register of deeds no later than 90 days after installation.

(b) *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, POWTs or private interceptor main sewer elevation permits.

b. 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" above the basement floor.

Note: See ch. SPS 382 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.' a. 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. In any room containing the recessed or concealed portions of sterilizers located in health care or related facilities, at least one floor drain connecting to the drainage system shall be installed in a manner to adequately drain the entire floor area.

(c) *Building sewers.* 1. 'Minimum depth.' a. The top of a building sewer shall be located at a depth of not less than 42″ below finished grade, except as provided in subd. 1. b. or subd. 2.

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" below finished grade.

2. 'Protection from frost.' a. Except as provided in subd. 2. c. to e., a building sewer or private interceptor main sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer or private interceptor main sewer is located less than 60" below a surface area from which snow will be cleared.

b. Except as provided in subd. 2. c. to e., a building sewer or private interceptor main sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer or private interceptor main sewer is located less than 42" below a surface area which snow will not be cleared.

c. Where a building sewer or private interceptor main sewer discharges to a holding tank, POWTs treatment tank or grease interceptor, the portion of a building sewer or private interceptor main 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 382.30−1 and Table 382.30−6 does not extend below the top of the building sewer.

e. Where a building sewer or private interceptor main sewer is installed to serve summer use public facilities, frost protection requirements shall not apply.

Note: This exemption applies to frost sleeves as provided in s. SPS 382.35 (5) (a) 2.

3. 'Insulation for building sewers.' Where required by subd. 2. a. or b., building sewer or private interceptor main sewer insulation for frost protection shall be provided in accordance with one of the methods specified in subd. 3. a. to d.

a. Extruded polystyrene foam insulation shall be installed at a depth of at least 18" below finished grade and at least 6" above the top of the sewer pipe. The minimum thickness and width of the foam insulation shall be determined from Figure 382.30−1 and Tables 382.30−5 to 382.30−7. If the insulation is to be installed more than 6" above the top of the sewer, the number of inches exceeding 6" shall be added to the width of insulation determined from Table 382.30−7.

b. Extruded polystyrene foam insulation shall be installed using a box method. The 3−sided box shall be formed with 3 lengths of polystyrene foam insulation where the top of the box extends horizontally to the farthest edge of both vertical sides. The insulation shall be installed at or below a depth of at least 12" below finished grade and 6" above the top and 6" from each side of the building sewer or private interceptor main sewer. The minimum thickness of the foam insulation shall be determined from Figure 382.30−1 and Table 382.30−5.

Note: See ch. SPS 382 Appendix for further explanatory material.

c. Lightweight insulating concrete shall be installed to the depth of the spring line of the sewer and shall extend laterally at least 6" on both sides of the sewer. The minimum thickness of the insulating concrete shall be determined from Figure 382.30−1 and Table 382.30−5. The thickness shall be measured from the top of the sewer. The top of the insulation shall be installed at least 12" below finished grade.

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

Figure 382.30−1. Frost protection zones.

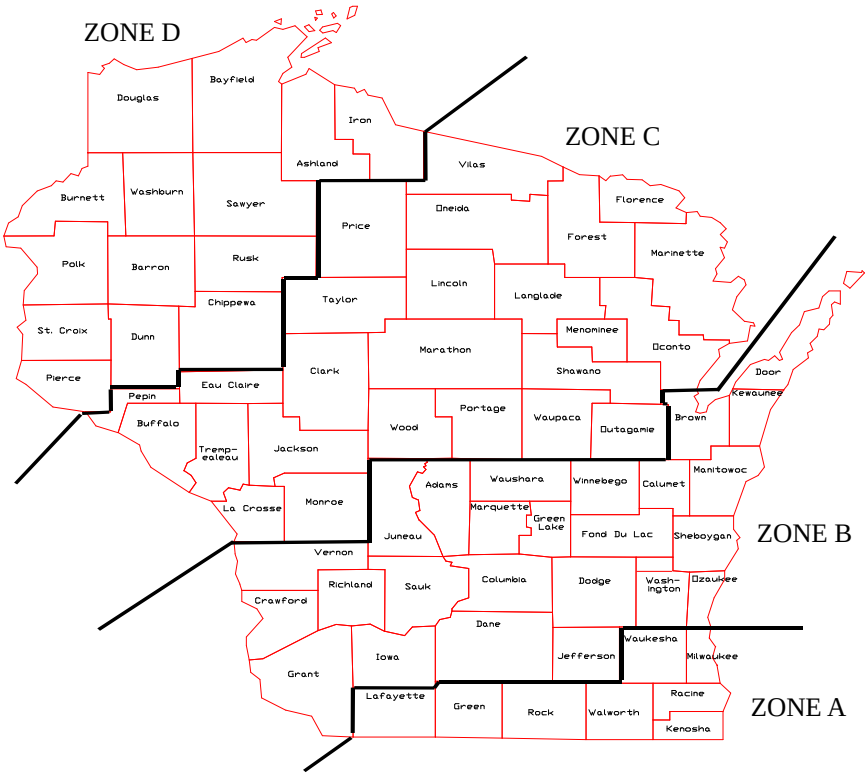

Table 382.30−5
Minimum Thickness of Insulation

Frost Protection 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 382.30−6
Predicted Depth of Frost in Various Types of Backfill Soil (in feet)

Soil Type	Frost Protection 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 382.30−7
Minimum Width of Extruded Polystyrene Foam Insulation (in feet)

Predicted Depth of Frost (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	2	NR			
3.5	4	3	2	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

NR means Not Required.

(d) *Location limitations.* Building drains, building sewers or private interceptor main sewers shall be separated from water wells by the applicable separation distances contained in chs. NR 811 and 812 or as otherwise approved by the department of natural resources.

Note: See s. SPS 382.40 for provisions regarding the separation of water supply piping, building sewers and private interceptor main sewers.

Note: See ch. SPS 382 Appendix for further explanatory material. Section NR 812.08 may require additional setbacks.

(e) *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 backfilled to comply with all the following requirements:

a. 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.

b. Where stone larger than one inch 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 that shall be of a size that all the material shall pass a ¾−inch sieve.

c. Bedding shall be sufficiently dry and hand or mechanically compacted to a minimum of 90 percent standard proctor density.

d. Initial backfill to a depth of 12 inches over the pipe shall be sand, crushed stone or excavated material which is neither corrosive nor organic in nature.

e. Initial backfill shall be of a size that passes a one−inch sieve.

f. A concrete floor may be placed over a building drain having less than 12 inches of initial backfill.

g. Initial backfill shall be placed in increments not to exceed 6 inches in depth.

h. Initial backfill shall be well tamped for the full width of the trench and length of the sewer.

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 providing one of the following options:

a. Sheathing shall be driven and left in place to a depth of 48 inches below the trench bottom or to solid foundation to a lesser depth.

b. 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.

c. Install a longitudinally reinforced concrete cradle the width of the trench and at least 3 inches thick.

d. Install a longitudinally reinforced concrete slab the width of the trench and at least 3 inches thick.

e. Backfill and bedding shall comply with subd. 2. d. to h.

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″ 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.

(f) *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. 281.41, 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 subd. 1. 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" 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" 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 all of the following requirements shall apply:

a. A curb stop shall be installed on the same property as close as possible to the connection to the common forced main sewer.

b. A check valve shall be installed in the pressurized building drain or building sewer.

c. An accessible quick disconnect shall be installed upstream of the check valve.

Note: See ch. SPS 382 Appendix for further explanatory material.

(g) *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 water and clear water connections.' Except as provided in s. SPS 382.36 (3), storm drain piping and clear water drain piping may not discharge to a sanitary building drain which connects to a publicly−owned treatment works.

Note: See s. SPS 382.36 for provisions relative to storm sewers.

(h) *Locating requirements.* A means to locate buried non−metallic sewers and private interceptor main sewers discharging to municipal mains shall be accomplished in accordance with one of the following options:

Note: See ch. SPS 382 Appendix for further information.

1. A tracer wire shall be installed in accordance with all of the following:

a. Tracer wire shall be installed along the length of the non−metallic pipe.

b. Tracer wire shall be a minimum of 18 gauge, insulated, single−conductor copper wire or equivalent.

c. Tracer wire shall be located directly above and within 6 inches of the non−metallic pipe.

d. Tracer wire shall be accessible and locatable within the owner's property at 400−foot intervals or increments thereof.

e. Exterior access locations shall include a means of protecting the tracer wire.

f. In−ground sleeves shall be installed as provided in s. SPS 382.35 (5) (a) 2. c. and d.

g. Where tracer wire is more than 6 inches from the pipe, tracer wire insulation color shall comply with subd. 1. h.

h. Tracer wire insulation color for non−metallic sewer pipe shall be green.

i. Tracer wire conductivity shall be tested prior to use.

j. Conductive warning tape may not be utilized in lieu of tracer wire.

2. Global positioning system data shall be recorded with the municipality where the non−metallic pipe is installed.

3. Another equally−effective means acceptable to the department shall be employed to mark the location of the non−metallic pipe.

(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. 281.41, 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. SPS 382.21.

(d) Private interceptor main sewers 6" 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" or larger in diameter shall be:

1. Provided with frost protection in accordance with sub. (11) (c); and

2. Installed in accordance with the municipal sewer criteria specified in s. NR 110.13.

(f) No private interceptor main sewer may pass through or under a building to serve another building, unless one of the following conditions are met:

1. The private interceptor main sewer serves farm buildings, farm houses, or both which are located on one property.

2. The private interceptor main sewer serves buildings that are located on one property and a document, which indicates the piping and distribution arrangement for the property and buildings, shall be recorded with the register of deeds no later than 90 days after installation.

(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 subds. 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; r. and recr. (4) (d), am. Table 82.30−3 and 82.30−7, r. (11) (intro.), renum. (11) (a) to (f) to be (b) to (g), cr. (11) (a) and (12) (f), Register, August, 1991, No. 428, eff. 9−1−91; am. Table 82.30−1, Register, April, 1992, No. 436, eff. 5−1−92; am. (7) (a) and (b), (11) (c) 1. a., (12) (e) 1. and Table 82.30−1, cr. (10) (a) 5., r. (11) (b) 1. b., renum. (11) (b) 1. c. to be (11) (b) 1. b., Register, February, 1994, No. 458, eff. 3−1−94; reprinted to restore dropped copy in (10) (b) 3. b., Register, July, 1994, No. 463; corrections in (11) (f) and (12) (g) made under s. 13.93 (2m) (b) 7., Stats., Register, April, 1998, No. 508; am. (11) (g) 2., Register, April, 2000, No. 532, eff. 7−1−00; CR 02−002: am. (4) (d) 5., (5) (b) 2. b., (c) 2., (10) (a) 2., (b) 4. b., (11) (b) 1. a., (c) 2. a. to c., 3. (intro.), (g) 2., (12) (f) (intro.) and 1., and Tables 82.30−1, 2, 3, 5 and 6, cr. (10) (b) 2. d., (c), (d), (11) (b) 3. b. and (c) 2. e., r. and recr. (11) (a) 2., (d), and (12) (f) 2., renum. (11) (b) 3., (c) 3. b. and c. to be (11) (b) 3. a., (c) 3. c. and d., Register April 2003 No. 568, eff. 5−1−03; CR 04−035: r. (3) (b) 32. a., am. Table 82.30−1 Register November 2004 No. 587, eff. 12−1−04; CR 07−069: cr. (11) (h) Register February 2008 No. 626, eff. 3−1−08; CR 08−055: am. (3), (6) (a) 2., (b) 1. to 3., (10) (a) 1., Tables 82.30−1 and 82.30−3, r. (4) (b), renum. (4) (c) to (e) and (11) (h) 1. g. to i. to be (4) (b) to (d), and (11) (h) 1. h. to j., r. and recr. (6) (b) 4., 5., (11) (e) 2., 3., (f) 2. and Table 82.30−2, cr. (11) (h) 1. g. Register February 2009 No. 638, eff. 3−1−09; correction in (6) (a) made under s. 13.92 (4) (b) 1., Stats., Register February 2009 No. 638; CR 10−064: am. (6) (a) 2., (b) (intro.), 5. a., Table 82.30−2, cr. (6) (c) Register December 2010 No. 660, eff. 1−1−11; correction in (2), (3) (a) 1., 2., (4) (a) 1., (c) 4., (5) (b) 1., 2. a., (c) 1., (6) (a) 2., (b) 5. a., b., (c), (8) (a), (9) (d), (10) (a) 3., 4., (d) 1. b., (11) (c) 2. d., 3. a., b., c., (g) 2., (h) 1. f., (12) (c), Table 328.30−1, Table 328.30−2 made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.31 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. SPS 384.

(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″ in diameter from the building drain to the vent terminal or vent header.

(4) VENT STACKS AND STACK VENTS. (a) *Where required.* A vent stack and a stack vent shall be installed to serve any drain stacks of 5 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" 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.

4. The connection of a vent stack with another vent may not be less than 38″ above the next higher floor level where the plumbing fixtures are vented, but in no case lower than 2" above the elevation of the highest flood level rim of any fixture served by the vent.

Note: See ch. SPS 382 Appendix for further explanatory material.

(5) RELIEF AND YOKE VENTS FOR STACK OFFSETS. (a) *Vents serving offsets of 30 to 45° in drain stacks.* 1. Except as permitted in subd. 2., where a horizontal branch connects to a drain 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 5 or more branch intervals, the offset shall be vented in accordance with par. (b) 1. to 3.

2. Where the drain stack and offset are sized as building drain as per Table 382.30–3, the vents serving the offset of 30 to 45° in a drain stack are not required.

(b) *Vents serving offsets of more than 45° in drain stacks.* Offsets of more than 45° in drain stacks shall be vented where 5 or more branch intervals are located above the offset. The offset shall be vented by venting the upper and lower section of the stack.

1. 'Upper section.' The upper section of the stack shall be vented as a separate stack with a vent stack connection installed in accordance with sub. (4). The offset shall be considered the base of the stack.

2. 'Vent connection above offset.' The vent stack shall connect with a wye pattern fitting above the stack offset and at or below the lowest drain branch above the offset.

3. 'Lower section.' The lower section of the stack shall be vented by a yoke vent connecting below the offset above or at the next lower horizontal branch.

a. Except as provided in subd. 3. b., the connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

b. The yoke vent connection may be a vertical extension of the stack.

c. The connection of the yoke vent to another vent shall not be less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

(6) RELIEF VENTS FOR STACKS OF MORE THAN 10 BRANCH INTERVALS. (a) Drain stacks of more than 10 branch intervals shall be provided with a relief vent at each tenth interval installed.

(b) The lower end of the relief vent required in par. (a) shall connect to the stack by use of a wye pattern fitting below the horizontal branch serving that floor.

(c) The upper end of the relief vent required in par. (a) shall connect to the vent stack not less than 38 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 38" above the next higher floor level where plumbing fixtures are installed that discharge through the building drain.

Note: See ch. SPS 382 Appendix for further explanatory material.

(8) VENTS FOR SANITARY SUMPS. (a) *Interior 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" of the sump.

(b) *Exterior sanitary sumps.* Sanitary sumps shall be provided with a vent that terminates in accordance with sub. (16) (h).

(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 382.31−1.

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 382.31−1. 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 ch. SPS 382 Appendix for further explanatory material.

Table 382.31−1

Maximum Developed Length Between Vent and Trap (in feet)

Diameter of Fixture Drain[a] (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)		
	1/8	1/4	1/2	1/8	1/4	1/2	1/8	1/4	1/2
1 1/4	NP[c]	5.0	2.5	NP	3.5	2.0	NP	1.5	1.0
1 1/2	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

[a] Diameters to be selected on the basis of the smallest drain pipe installed downstream from the trap serving a particular fixture.
[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.
[c] NP means Not Permitted.
[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 wall outlet fixtures or at least 2 but not more than 8 floor outlet fixtures, other than blowout type fixtures and wall−outlet carrier type water closets, are connected to the same horizontal branch drain, may be vented by a circuit vent in accordance with pars. (a) to (e).

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

(b) 1. A circuit vented horizontal drain into which 4 or more fixtures discharge shall be provided with a relief vent. 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 ch. SPS 382 Appendix for further explanatory material.

(c) A horizontal drain served by a circuit vent may not diminish in size from the most downstream fixture drain connection vented by the circuit vented drain 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) Additional 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 a maximum of 2 fixtures 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 with-

out 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).

Note: See ch. SPS 382 Appendix for further explanatory material.

(12) RETURN VENTS. Plumbing fixtures may be vented in accordance with pars. (a) to (d).

(a) Wall outlet fixtures may be vented by extending an individual vent, vertical wet vent or a common vent as high as possible under the fixture enclosure and returning the vent vertically downward and connecting the vent to the fixture drain or branch 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 $\frac{1}{4}$" per foot to the drainage point shall be provided.

(d) Cleanouts shall be provided on the vent piping in accordance with s. SPS 382.35.

Note: See ch. SPS 382 Appendix for further explanatory material.

(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 subd. 1. 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 drain between the 2 fixtures shall be at least one pipe size larger than the upper fixture drain, but not smaller than 2" in diameter.

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.

Note: See ch. SPS 382 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" in diameter. No more than 4 drainage fixture units may discharge into a 2" 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) *Other types of wet vents.* 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. No more than 2 wall outlet fixtures, each fixture with a drainage fixture unit value of one or less, may have their fixture drains connected into the individual vent, common vent, circuit vent or relief vent.

2. The wet vent shall be at least 2" 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 fixtures served by the wet vent.

Note: For explanatory material refer to ch. SPS 382 Appendix A−382.31 (13).

(14) VENT SIZE. (a) *Stack vents and vent stacks.* Stack vent and vent stack pipe sizes shall be determined in accordance with Table 382.31−2 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 ch. SPS 382 Appendix for further explanatory material.

(b) *Vent headers.* 1. Vent header pipe sizes shall be determined in accordance with Table 382.31−3 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 ch. SPS 382 Appendix for further explanatory material.

(c) *Branch vents.* Branch vent pipe sizes shall be determined in accordance with Table 382.31−3. 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 ch. SPS 382 Appendix for further explanatory material.

(d) *Individual vents.* Individual vent pipe sizes shall be determined in accordance with Table 382.31−3. 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 ch. SPS 382 Appendix for further explanatory material.

(e) *Common vents.* Common vent pipe sizes shall be determined in accordance with Table 382.31−3. 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.

Table 382.31−2

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)									
	1 1/4	1 1/2 [a]	2	3	4	5	6	8	10	12
1 1/2	50	150	NL [b]							
2	NP [c]	50	150	NL						
3		NP	50	400	NL					
4		NP	20	180	700	NL				
5			NP	50	200	700	NL			
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

[a] Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.
[b] NL means No Limit.
[c] NP means Not Permitted.

Table 382.31−3

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)								
	1 1/4 [a]	1 1/2 [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

[a] No water closets permitted.
[b] Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.
[c] NL means No Limit.
[d] NP means Not Permitted.

(f) *Circuit vents.* Circuit vent pipe sizes shall be determined in accordance with Table 382.31−3. 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.

(g) *Relief vents.* Relief vents shall be sized in accordance with the provisions of subds. 1. to 3. 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 382.31−3 based on the number of drainage fixture units served by the vent.

2. '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 382.31−3 based on the number of drainage fixture units served by the vent.

3. 'Horizontal wet vent.' The diameter of a relief vent serving a horizontal wet vent shall be at least 1½". The maximum developed length shall be determined from Table 382.31−3 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 subd. 1. b., the size of a vent for a sanitary pump with other than a pneumatic ejector, shall be determined in accordance with Table 382.31−4.

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 382.31−4, but shall not be less than 2″ 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" in diameter where the ejector is located outside and $1^1/_4$" in diameter for all other ejector locations.

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

Table 382.31−4

Size and Length of Vents for Sanitary Sumps

Discharge Capacity of Ejector (gpm)	Maximum Developed Length of Vent[a] (feet)				
	Diameter of Vent (inches)				
	$1^1/_4$[d]	$1^1/_2$[d]	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			NP	24	130

[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.
[b] NL means No Limit.
[c] NP means Not Permitted.
[d] Diameter not permitted for exterior sumps.

(j) *Vents for chemical basins.* The size of vents serving chemical dilution or neutralizing basins shall be determined in accordance with Table 382.31−3 and based upon the number of drainage fixture units discharging into the basins.

(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 subs. (12) and (17), vent piping serving a wall−outlet fixture may not offset horizontally less than 36" 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" above the floor, but in no case lower than 2" above the elevation of the highest flood level rim of any fixture served by the vent.

Note: See ch. SPS 382 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" 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" in diameter. Where it is necessary to increase the diameter of the vent, the change in diameter shall be made at least 6" inside the building.

Note: See ch. SPS 382 Appendix for further explanatory material.

(h) *Penetrations through grade.* Except when installation is in accordance with par. (d) 3., penetrations through grade shall terminate at least 12" above finished grade and terminate with a vent cap or return bend.

(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 fixtures in accordance with subd. 1. a. to e.

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

b. The drain stack shall be limited to serving fixtures with a drainage fixture unit value of no greater than 2.0. A urinal may not discharge into the combination drain and vent portion of the stack. The largest drainage fixture unit value served by the stack shall determine the stack size as specified in Table 382.31−5.

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 382.31−1.

e. The drain stack and its attendant vent shall be sized in accordance with Table 382.31−5.

Note: See ch. SPS 382 Appendix for further explanatory material.

Table 382.31−5

Stack Sizing by DFU Value

Drainage Fixture Unit (dfu) Value	Size of Stack (inches)
0.5	$1^1/_2$
1.0	2
2.0	3

2. A drain stack may serve as a combination drain and vent system for a kitchen sink and a wall outlet fixture with a drainage fixture unit value of 2 or less in accordance with subd. 2. 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 wall outlet fixture with a drainage fixture unit value of 2 or less. 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 connection to the lower fixture.

c. In lieu of the minimum sizes as required in subd. 2. 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 lower fixture.

(b) *Building drains.* A building drain or a building subdrain 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 or drain at least 2 inches in diameter shall be connected upstream of any building drain branch or building subdrain branch.

2. No more than 2 water closets may connect to the building drain or building subdrain by means of building drain branches or building subdrain branches.

3. a. That portion of the building drain or building subdrain between the connection of the building drain branch or building subdrain branch and the vent or drain required in subd. 1. shall be at least one pipe size larger than the minimum size permitted in Table 382.30–3 based on the total drainage fixture unit load, but not less than 3 inches.

b. The vent or drain required in subd. 1. shall be at least one−half the diameter of that portion of the building drain or building subdrain which is vented by the vent or drain, but may not be less than 2 inches in diameter.

c. A vent serving a drain required in subd. 1., shall be at least one half the diameter of that portion of the building drain or building subdrain which is vented by the system, 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 or building subdrain branch shall be at least 3" in diameter.

5. A building drain branch or building subdrain branch may not connect to a building drain or building subdrain downstream from the base fitting of a drain stack 2" or larger in diameter within the distance equal to 20 pipe diameters of the building drain or building subdrain.

6. The pitch and the developed length of the building drain branch or building subdrain branch may not exceed the limits specified in Table 382.31−1.

Note: See ch. SPS 382 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 subds. 1. to 7.

1. A vent stack or a drain stack at least 2" 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 382.30−2 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″ 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" in diameter.

3. All fixture drains vented by the horizontal drain shall be at least 3" in diameter.

4. Fixture drains to be vented by the horizontal drain shall connect individually to the horizontal drain.

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 382.31−1.

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" or larger in diameter within the distance equal to 20 pipe diameters of the horizontal drain serving the stack.

Note: See ch. SPS 382 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; reprinted to correct (17) (c) 4., Register, February, 1991, No. 422; cr. (4) (b) 4. and (17) (a) l. f., r. and recr. (5) (c) l. c. and (17) (c) 4., am. (5) (c) 2. c., (10) (intro.), (b) 1., (11) (b), (17) (a) l. e. and (17) (b), Register, August, 1991, No. 428, eff. 9−1−91; am. (6) (c), (7) (b), (10) (intro.), (a), (b) 1., (e), (13) (a) 1. c., (c) (intro.), 1. and 4., r. (16) (h), Register, February, 1994, No. 458, eff. 3−1−94; CR 02−002: renum. (8) to be (8) (a) and am., cr. (8) (b), (14) (j) and (16) (h), am. (11) (a), (12) (intro.), (a), (13) (c) 1. (17) (a) 1. (intro.) to b., and Table 82.31−4, r. and recr. Table 82.31−5, Register April 2003 No. 568, eff. 5−1−03; CR 08−055: am. (4) (a), (10) (c), (13) (a) 1. e., (14) (g) 2., (17) (a) 1. e., (b) 1. and 3., r. and recr. (5) and (6), r. (17) (a) 1. f. Register February 2009 No. 638, eff. 3−1−09; correction in (17) (a) 1. (intro.) made under s. 13.92 (4) (b) 7., Stats., Register February 2009 No. 638; CR 10−064: am. (5) (a) 2., (6) (c), (17) (a) 2., r. (14) (g) 2., renum. (14) (g) 3. and 4. to be (14) (g) 2. and 3. Register December 2010 No. 660, eff. 1−1−11; correction in (14) (g) (intro.) made under s. 13.92 (4) (b) 7., Stats., Register December 2010 No. 660; correction in (2), (5) (a) 2., (9) (a) 1., 2., (12) (d), (14) (a) (intro.), (b) 1., (c), (d), (e), (f), (g) 1., 2., 3., (i) 1. a., b., (j), (17) (a) 1. b., d., e., (b) 3. a., 6., (c) 2. a., 6. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.32 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. SPS 384.

(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) or as otherwise permitted by this chapter. A fixture shall not be double trapped.

(a) *Trap exceptions.* The plumbing fixtures listed in subds. 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" deeper than any other;

b. The distance between the compartments' waste outlets farthest apart does not exceed 30"; and

c. No compartment waste outlet is equipped with a food waste grinder.

3. Storm drains as provided in s. SPS 382.36 (12) (a).

(b) *Trap seals.* Each trap shall provide a liquid seal depth of not less than 2" and not more than 4", 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 or other means of trap seal protection acceptable to the department shall be provided for a trap subject to seal loss due to evaporation.

Note: Liquids acceptable to use for reducing trap seal evaporation include mineral oil, vegetable oil, propylene glycol and glycerin.

2. Trap seal primer valves shall conform to ASSE 1018.

Note: A list of referenced standards is contained in ch. SPS 381.

(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 382.30−1 of s. SPS 382.30.

(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 subd. 1. 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".

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".

b. The vertical distance between the top of the fixture drain outlet of a pedestal fixture or a cuspidor and the horizontal center line of the trap outlet shall not exceed 60".

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".

d. The vertical distance from the inlet to the horizontal centerline of the fixture drain for a campsite receptor, exterior storm drain inlet, or a receptor for a sanitary dump station may exceed 3 feet so as to permit the trap to be installed below the predicted depth of frost.

2. 'Horizontal distance.' Except as provided in subd. 2. a. and b., the horizontal distance between the vertical centerline of a fixture drain outlet and the vertical centerline of the trap inlet shall not exceed 15".

a. The horizontal distance for a pedestal drinking fountain shall not exceed 24".

b. The horizontal distance for an exterior sanitary area drain or a residential garage floor drain discharging through an interior trap shall not exceed 25 feet.

c. The minimum horizontal distance between the vertical centerline of the outlet from a floor−mounted water closet and a 3−inch double tee shall be 30 inches.

Note: See ch. SPS 382 Appendix for further explanatory material.

(5) DIRECT FIXTURE DRAIN CONNECTION. Except as provided in s. SPS 382.33, 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" 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".

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 subd. 4. a. and b.

a. Where the vertical drain is 3" 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; am. (4) (b) 1. b., Register, April, 2000, No. 532, eff. 7−1−00; CR 02−002: r. and recr. (3) (c) 1. and (4) (b) 2., am. (4) (b) 1. b., cr. (4) (b) 1. d., Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. (3) (intro.) Register January 2004 No. 577, eff. 2−1−04; CR 04−035: am. (3) (a) 3. Register November 2004 No. 587, eff. 12−1−04; CR 08−055: cr. (4) (b) 2. c. Register February 2009 No. 638, eff. 3−1−09; correction in (2), (3) (a) 3., (e), (5) (intro.) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.33 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 382.33−1, shall be considered as plumbing and shall comply with the provisions of this section.

(2) MATERIALS. Indirect waste piping more than 30" in length and all local waste piping shall be of approved materials in accordance with ch. SPS 384.

(3) SIZE. Except as provided in pars. (a) and (b), indirect waste piping more than 30" in length and all local waste piping shall be sized in accordance with s. SPS 382.30.

(a) Indirect or local waste piping not exceeding 20 feet in length for refrigerated food display cases may not be less than one inch in diameter.

(b) Indirect waste piping, attached to an appliance, appurtenance or equipment through which pressurized waste is discharged, shall be sized in accordance with specifications of the manufacturer of the appliance, appurtenance or equipment.

Table 382.33−1

Types of Fixtures, Appliances and Devices of a Public Health Concern

Refrigerated food storage rooms and compartments
Refrigerated food display cases
Ice compartments
Vending machines
Steam tables and kettles
Food preparation sinks
Potato peelers
Egg boilers
Boiler blowoff basin outlet drains
Coffee makers and urns
Food processing equipment
Baptismal founts
Clothes washers and extractors
Dishwashers
Stills
Sterilizers
Bar and soda fountains
Boiler blowoff basin outlet drains

(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" in length shall be provided with a trap in accordance with s. SPS 382.32 (4), except indirect waste piping draining a sterilizer shall not be trapped.

2. All indirect waste piping draining a refrigerated food storage room, compartment or display case shall be provided with a trap in accordance with s. SPS 382.32 (4).

(b) *Local waste piping.* Local waste piping handling sanitary wastes and more than 30" in length shall be provided with a trap in accordance with s. SPS 382.32 (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.

Note: See ch. SPS 382 Appendix for further explanatory material.

(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.* The installation of an air gap shall conform to any of the following requirements:

1. The distance of an air gap shall comply with one of the following:

a. The distance of an air gap serving indirect waste piping one inch or less in diameter and a receptor shall be at least twice the diameter of the indirect waste piping.

b. The distance of an air gap between indirect waste piping larger than one inch in diameter and a receptor shall not be less than 2 inches.

2. The installation of all air−gap fittings shall comply with ASME A112.1.3.

3. The installation of a residential dishwashing machine manufactured air gap shall comply with ASSE 1021.

(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 and terminating at an elevation above the trap outlet.

Note: See ch. SPS 382 Appendix for further explanatory material.

(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.* A waste sink or a standpipe serving as a receptor shall have its rim at least one inch above the floor.

(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.* Local waste piping may not receive discharge from another local waste pipe.

(d) *Other receptors.* A plumbing fixture may not be used as a receptor for indirect or local waste piping, except as provided in subds. 1. to 7.

1. The indirect waste piping of a portable dishwasher or water treatment device serving one or 2 outlets may discharge into a kitchen sink of a dwelling unit or to a branch tail piece serving a kitchen sink.

2. The indirect waste piping of an automatic clothes washer or water treatment device may discharge into a laundry tray.

3. The indirect or local waste piping serving a cross connection control device or assembly, water treatment device, air conditioner, humidifier or furnace condensate may discharge into a branch tailpiece serving a laundry tray.

4. The local waste piping serving a water heater temperature and pressure relief valve, water treatment device, cross connection control device or assembly, humidifier, sterilizer, or a furnace or air conditioner may discharge into the riser of a floor drain when installed in accordance with sub. (7) (b).

5. The indirect or local waste piping serving a water heater temperature and pressure relief valve, water treatment device, cross connection control device or assembly, or a furnace or air conditioner may discharge to a floor served by a floor drain so as not to create a health or safety hazard.

6. The indirect or local waste piping serving a water heater temperature and pressure relief valve or water treatment device may discharge through the cover of a clear water sump so as not to adversely affect floats by means of a fixed air gap installed in accordance with subs. (7) (a) 2. and (8).

7. The indirect waste piping serving a dental mold grinder may discharge into the riser or a trap serving a laboratory sink that is provided with a plaster trap and is installed within 3 feet of the mold grinder.

Note: See ch. SPS 382 Appendix A−382.33 (8) (a) to (d) 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. a. Except as provided in subd. 2. b., wastewater more than 160° F in temperature shall be discharged by means of indirect waste to the plumbing system.

b. Steam condensate blow down shall be cooled to 160°F in temperature prior to discharging to a plumbing system.

(b) *Clear water.* When discharging to a plumbing system, all clear water shall discharge by means of an air−gap.

(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 may not extend more than 36 inches nor less than 18 inches above the centerline of the trap outlet.

b. A standpipe receptor shall terminate at least 26 inches but not more than 48 inches above the floor on which the clothes washer is located.

2. 'Self−service laundries.' Pumped−discharge automatic clothes washing equipment in launderettes, 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 382.33−2.

b. Washer wastes shall not be discharged to gutters, troughs, local waste piping, indirect waste manifold or other similar connections.

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 ch. SPS 382 Appendix for further explanatory material.

c. All wastes from the washers shall flow through a Commercial laundry interceptor as specified in s. SPS 382.34.

Table 382.33−2

Washer Connections

Trap Diameter	Maximum Number of Washers
2 inches	1 machine
3 inches	3 machines
4 inches	4 machines

(d) *Dishwashing machines.* All dishwashing machines shall discharge to the sanitary drain system.

1. 'Residential type.' The indirect waste piping from a residential−type dishwashing machine shall not exceed a developed length of 10 feet. The indirect waste piping from a residential−type dishwashing machine shall be installed in accordance with one of the following methods:

a. Where an air−gap or air−break is located below the countertop, the indirect waste piping from the dishwashing machine shall discharge to a standpipe. The standpipe shall be at least 1 ½ inches in diameter and shall extend at least 15 inches above the trap weir.

b. Where an air−gap or air−break is located above the countertop, the indirect waste piping from the dishwashing machine shall discharge to local waste piping. The local waste piping shall connect to the kitchen sink branch tailpiece above the trap inlet, the standpipe or to the dishwashing machine connection of a food waste grinder. When the local waste piping discharges to a standpipe, the standpipe shall be at least 1 ½ inches in diameter and shall extend at least 15 inches above the trap weir. 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 an air−gap or air−break into a trapped and vented receptor. The indirect waste piping may not be more than 30 inches in length.

(e) *Drips and drain outlets.* Appliances, devices and apparatus not defined as plumbing fixtures which have drip or drain outlets, which discharge to the plumbing system, shall discharge into an approved receptor by means of an approved air−gap or air−break.

(f) *Elevator drains.* 1. All drains serving elevator pits shall discharge to the storm drain system as specified in s. SPS 382.36 (4).

2. Drains serving elevator pits shall not connect directly with the storm drain system by means of gravity flow piping.

3. A sump may not be located in an elevator machine room.

4. A drain serving an elevator pit that discharges to a sump shall have a submerged inlet constructed to maintain a minimum 6″ trap seal.

5. A sump located in an elevator pit may only receive storm or clear water waste from the elevator pit or the elevator machine room, or both.

Note: See ch. SPS 382 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. SPS 382.31, 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" in length.

b. The indirect waste piping draining a novelty box or ice compartment may 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" below the top of the 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. 'Food preparation.' Open culinary sink compartments for thawing or washing food shall discharge to the sanitary drain system through an independent connection by means of an air−gap. The fixture drain upstream of the air−gap shall not exceed a length of 30″.

Note: See ch. SPS 382 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. SPS 382.50 regarding sterilizer wastes.

(i) *Cross connection control devices or assemblies.* Where a receptor is provided, the vent port discharge from cross connec-

tion control devices or assemblies shall discharge to the receptor by means of an air−gap.

(j) *Vacuum systems—central units.* Central vacuum units shall discharge by means of an air−gap or air break.

(k) *Swimming pools.* 1. The backwash and drain wastewater from a swimming pool, wading pool or whirlpool shall discharge in accordance with Table 382.38−1.

2. The discharge from deck drains serving indoor pools shall be directed to the sanitary sewer via an air−gap.

3. The discharge from deck drains serving outdoor pools shall be directed to the storm sewer by way of an air−gap or to grade.

4. The requirements for sewer connections as specified in ch. SPS 390 applies to all public swimming pools.

(10) WATER TREATMENT DEVICES. (a) The waste discharge of a water treatment device to the drain system shall be protected in accordance with s. SPS 382.41 with respect to cross connection control.

(b) The indirect waste piping or tubing from a water treatment device shall be of a material conforming to one or more of the standards listed in Tables 384.30−8 or 384.30−11.

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; r. and recr., (3), am. (9) (c) 1. a., (d) 2. and (g) 4., Register, August, 1991, No. 428, eff. 9−1−91; am. (8) (d) 1., 2. and (9) (g) 3. b., r. (9) (k), cr. (10), Register, February, 1994, No. 458, eff. 3−1−94; correction in (9) (i) 5., made under s. 13.93 (2m) (b) 7., Stats., Register, February, 1994, No. 458; r. and recr. (9) (f), Register, April, 1998, No. 508, eff. 5−1−98; correction in (9) (i) 5. made under s. 13.93 (2m) (b) 7., Stats., Register, April, 1998, No. 508; r. and recr. (9) (i), cr. Table 82.33−3, Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: am. (5) (a) 2., (7) (b), (9) (c) 1. b., (e), (g) 6., renum. (8) (a) 1., (9) (a) 2. and (10) to be (8) (a), (9) (a) 2. a. and (10) (a) and am. (9) (a) 2. a., r. (8) (a) 2., r. and recr. (8) (c), (d), (9) (b), (d) 1. and (i), cr. (9) (a) 2. b., (c) 1. c., and (10) (b) Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. (9) (c) 1. b., r. (9) (d) 3. and table 82.33−3, cr. (9) (k) Register January 2004 No. 577, eff. 2−1−04; CR 08−055: r. and recr. (7) (a), cr. (8) (d) 6. and 7., am. (9) (c) 1. a., b. and (f) 1., r. (9) (c) 1. c. Register February 2009 No. 638, eff. 3−1−09; correction in (8) (d) (intro.) made under s. 13.92 (4) (b) 7., Stats., Register February 2009 No. 638; CR 10−064: am. Table 82.33−2 Register December 2010 No. 660, eff. 1−1−11; correction in (1) (b), (2), (3) (intro.), (5) (a) 1., 2., (b), (9) (c) 2. a., 3. c., (f) 1., (g) 1., (k) 1., 4., (10) (a), (b) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.34 Wastewater treatment and holding devices. (1) SCOPE. The provisions of this section set forth the requirements for design and installation of plumbing wastewater treatment and holding devices, appurtenances and systems, including but not limited to interceptors, catch basins, decontamination tanks and dilution and neutralizing basins.

(2) MATERIALS. All piping, devices and appliances for wastewater treatment and holding devices, appurtenances and systems shall be of approved materials in accordance with ch. SPS 384.

(3) GENERAL. Any deleterious waste material which is discharged into a plumbing system shall be directed to a wastewater treatment or holding device. The wastewater treatment or holding device shall be capable of separating, diluting or neutralizing the deleterious waste material to a degree that the wastewater is no longer deleterious. Wastewater treatment or holding devices that retain any waste materials shall be designed and installed to facilitate periodic removal or treatment, or both.

(a) *Treatment for reuse.* 1. Except as limited in subd. 2., graywater, storm water, clear water, blackwater and other wastewaters as approved by the department may be reused in conformance with s. SPS 382.70.

2. Except as provided in subd. 3., wastewater discharged from water closets or urinals shall not be reused for drinking water.

3. All treatment works permitted by the department of natural resources, or a POWTS which includes an in situ soil dispersal or treatment component may treat wastewater discharged from water closets or urinals for reuse.

(b) *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 ch. ATCP 93 as to flammable, combustible, and hazardous liquids.

(c) *Private systems.* The special or industrial wastes from any plumbing system shall be treated, held or dispersed in compliance with the rules of the state agency having jurisdiction. The treatment, holding or dispersal system shall be installed so as not to endanger any water supply which is or may be used or which may create a nuisance, unsanitary conditions or water pollution.

(d) *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.

(e) *Maintenance.* All devices installed for the purpose of intercepting, separating, collecting, holding or treating harmful, hazardous or deleterious materials in liquid or liquid−borne wastes shall be operated and cleaned of intercepted or collected materials or of any residual from treatment at such intervals which may be required to prevent their passage through the interceptor.

(f) *Service reassembly.* Any fixed orifice, vent or trap of an interceptor, catch basin or other similar device shall remain intact and shall not be removed or tampered with except for cleaning purposes. After service, all parts of the interceptor, collector or treatment device, such as baffles, weirs, orifice plates, channels, vents, traps, tops, and fastening bolts or screws shall be replaced in proper working position.

(g) *Location.* 1. Wastewater holding devices, interceptors, catch basins and other similar devices shall be accessible for service, maintenance, repair and inspection.

a. No wastewater holding device, interceptor, catch basin or similar device may be surrounded or covered as to render it inaccessible for service or inspection.

b. No wastewater holding device, interceptor, catch basin or similar device may have its top located more than 6 feet above the surrounding floor.

c. Enough space shall be provided to enable the removal of any interior parts of the wastewater holding device, interceptor, catch basin or similar device.

d. At least 18 inches of clear space shall be provided above the top of the wastewater holding device, interceptor, catch basin or similar device.

2. An exterior wastewater holding device, interceptor, catch basin or similar device shall not be located within 5 feet of a building or any portion of a building or swimming pool; 10 feet of water service; 2 feet of a lot line and 10 feet of a clearwater cistern.

3. An exterior wastewater holding device, interceptor, catch basin, or similar device shall not be located within 10 feet of the high water mark of a lake, stream, pond or flowage.

Note: The department of natural resources under chs. NR 811 and 812 may require additional setbacks. See ch. SPS 382 Appendix for further explanatory material.

(h) *Disposition of retained materials.* Deleterious waste materials retained by a wastewater holding device, interceptor, catch basin or similar device shall not be introduced into any drain, sewer or natural body of water without approval of the state agency having jurisdiction.

(4) GARAGE FLOOR AREA WASTEWATER. (a) *Garages for public buildings and facilities.* 1. Where a drain will be installed to receive the wastewater from floor areas of public buildings and facilities on which self−propelled land, air or water vehicles can

be driven, the wastewater shall discharge using one of the following methods:

a. In areas where vehicles will be serviced, the wastewater shall discharge through a garage catch basin or oil interceptor connected to a municipal sewer or holding tank approved to receive industrial wastewater.

b. In areas where vehicles will be driven or stored, the wastewater shall discharge through a floor drain equipped with a solid bottom sediment bucket, garage catch basin or oil interceptor.

2. Garage catch basins design shall conform to all of the following:

a. The holding area of the catch basin shall be watertight.

b. The catch basin shall have a minimum inside diameter of 36″.

c. The minimum depth of the basin shall be 24” measured from the lowest portion of the trap on the outlet of the basin.

d. The outlet of the basin shall be at least 4” in diameter and trapped with a water seal of at least 6” and constructed on the interior or exterior of the basin. Where an external trap is provided, the trap shall be within 36” of the basin.

e. Except as provided in subd. 5., the water line in the basin shall be at least 2” below all horizontal drains discharging into the basin. Where an external trap is provided, the measurement point on the horizontal drain shall be upstream of the trap.

f. The basin shall be provided with a cover at least 23 inches square or 23 inches in diameter.

g. Gravity drains from fixtures serving garage floor areas located on different floors from the basin may discharge into the basin if the drain stack carrying the wastewater is located at a distance equal to at least 20 times the inside diameter of the horizontal piping upstream of the basin.

h. Catch basins with solid covers shall be vented in accordance with sub. (8) (c).

3. Drains with traps may connect to the garage catch basin under all of the following conditions:

a. The trap shall be a minimum of 3” in diameter.

b. Except as provided in subd. 3. c., the developed length from all trap outlets to the basin shall not exceed the distance as specified in Table 382.31−1.

c. Where the maximum distance exceeds that as specified in Table 382.31−1, the trap shall be vented in accordance with s. SPS 382.31 (3) and the connection to the basin shall form a 6−inch trap seal. The trap seal may be constructed on either the interior or exterior of the basin, but within 36” of the basin.

4. Drains without traps may discharge into a garage catch basin under all of the following conditions:

a. The fixture drain shall have a minimum 4−inch inside diameter.

b. The fixture drain shall be piped with a 6−inch water seal constructed either on the interior or exterior of the basin.

c. An exterior trap shall be constructed within 36” of the basin.

d. The developed length of the fixture drain shall not exceed the distance equal to 24 times the diameter of the fixture drain.

e. Fixture drains shall individually discharge into a garage catch basin.

5. Pressurized drains from garage floor areas discharging to a garage catch basin shall conform to all of the following conditions:

a. The pressurized drain piping shall terminate inside the basin with a 6−inch submerged inlet. The termination shall be at least 12” above the floor of the basin.

b. The pressurized equipment, devices and piping shall be designed and installed to produce a maximum velocity of 2 feet per second at the point of connection to the basin.

Note: Plans for garage floor discharge−holding tanks may require plan approval by the department of natural resources.

(b) *Garages for one− and 2−family dwellings.* 1. Floor drains serving garages for one− and 2−family dwellings shall be provided with a solid bottom sediment basket.

Note: See ch. SPS 382 Appendix for further explanatory material.

2. a. Except as permitted in subd. 2. b., catch basins serving garages for one− and 2−family dwellings shall be designed and installed in accordance with par. (a) 2.

b. The minimum inside diameter of catch basins serving garages for one− and 2−family dwellings shall be 18 inches.

(c) *Grates for garage catch basins, floor drains and trenches.* A garage catch basin, floor drain and trench drain shall be provided with an approved, removable cast iron or steel grate of a thickness and strength for the anticipated loads. The grate shall have an available inlet area equal to at least the outlet drain for the catch basin, floor drain or trench drain.

(5) GREASE AND OIL TREATMENT. (a) All plumbing installations for occupancies, other than dwelling units, where grease, fats, oils or similar waste products of cooking or food are introduced into the drain system shall be provided with grease and oil treatment in accordance with this subsection.

(b) *General.* 1. ‘Public sewers.’ All new, altered or remodeled plumbing systems which discharge to public sewers shall be provided with one or more grease interceptors.

a. Where one or more exterior grease interceptors are provided all, and only, kitchen wastes shall be discharged to an exterior interceptor.

b. Except as required in subd. 1. c. or d., where one or more interior grease interceptors are provided the wastes from a food waste grinder, a sanitizing compartment of a sink or a rinse compartment of a sink, may bypass the interceptor or interceptors.

c. The wash compartment of a scullery sink shall discharge through a grease interceptor.

d. The pre−wash compartment not discharging through a garbage disposal shall discharge through a grease interceptor.

2. ‘Private onsite wastewater treatment systems.’ All new, altered or remodeled plumbing systems which discharge to private onsite wastewater treatment systems shall be provided with exterior grease interceptors.

a. Except as provided in subd. 2. b., only kitchen and food wastes shall be discharged to an exterior grease interceptor.

b. For remodeling, when it is not practicable to separate kitchen and toilet wastes, combined kitchen wastes and toilet wastes may be discharged directly to a private onsite wastewater treatment component tank or tanks which conform to par. (c). The required capacity of a grease interceptor shall be added to the required septic tank capacity as specified in ch. SPS 383.

c. For holding tank installations, the combined kitchen and toilet wastes may discharge directly to a holding tank where the location accepting the pumpage from the tank provides written acceptance of the combined waste to the department.

3. ‘Existing installations.’ The department may require the installation of any treatment device deemed necessary by the department for existing plumbing installations where the waterway of a drain system, sewer system or private onsite wastewater treatment system is reduced or filled due to grease.

(c) *Exterior grease interceptors.* Exterior grease interceptors shall receive the entire waste discharge from kitchens or food processing areas. All exterior interceptors shall be designed and constructed in accordance with this paragraph, so as to constitute an individual structure.

1. ‘Design.’ a. The liquid depth of the interceptor shall not be less than 42” nor more than an average of 72”.

b. A rectangular interceptor tank shall have a minimum width of 36″ and a minimum length of 72”. The longest dimension of the tank shall be parallel to the direction of waste flow.

c. A horizontal−cylindrical interceptor tank shall have a minimum inside diameter of 52” and a minimum length of 72”. The

longest dimension of the tank shall be parallel to the direction of waste flow.

d. Vertical−cylindrical interceptor tanks shall have a minimum inside diameter of 72".

e. Each prefabricated interceptor tank shall be clearly marked to indicate liquid capacity and the name and address or registered trademark of the manufacturer. The markings shall be impressed into or embossed onto the outside wall of the tank immediately above the outlet opening. Each site−constructed concrete tank shall be clearly marked at the outlet opening to indicate the liquid capacity. The marking shall be impressed into or embossed onto the outside wall of the tank immediately above the outlet opening.

f. The inlet and outlet openings of interceptor tanks or tank compartments shall be provided with, open−end sanitary tee fittings or baffles, so designed and constructed as to distribute the flow and retain the grease in the tank or tank compartments. The sanitary tee fittings or baffles shall extend at least 6" above the liquid level. At least 2" of clear space shall be provided above the top of the sanitary tee fittings or baffles. The sanitary tee fitting or baffle at the inlet opening shall extend below the liquid level of the tank a distance equal to $\frac{1}{3}$ of the total liquid depth. The sanitary tee fitting or baffle at the outlet opening shall extend below the liquid level of the tank a distance equal to $\frac{2}{3}$ of the total liquid depth. The waterline in the interceptor shall be at least 2" below the horizontal drain discharging to the interceptor.

g. Each compartment of an interceptor tank shall be provided with at least one manhole opening located over either the inlet or outlet opening. Additional manhole openings shall be provided such that no interior compartment wall of a tank is more than 4 feet from the edge of the manhole opening. The distance between manhole openings serving the same compartment shall not exceed 8 feet. Manhole openings shall be not less than 23" in the least dimension. Manholes shall terminate at or above ground surface and be of approved materials. Steel tanks shall have a minimum 2" collar for the manhole extensions permanently welded to the tank. The manhole extension on fiberglass tanks shall be of the same material as the tank and an integral part of the tank. The collar shall have a minimum height of 2".

h. Manhole risers for interceptor tanks shall be provided with a substantial, fitted, watertight cover of concrete, steel, cast iron or other approved material. Manhole covers shall terminate at or above grade and shall have an approved locking device.

i. A minimum 4 × 6 inch permanent label shall be affixed to the manhole cover, identifying the interceptor tank with the words GREASE INTERCEPTOR. Where the tank acts as the septic tank and grease interceptor the label shall identify it as such. The wording used on the warning label shall be approved by the department, as part of the materials approval for the tank under ch. SPS 384.

j. An inlet or outlet opening which does not have a manhole opening as specified in subd. 1. g. shall be provided with an airtight inspection opening located over the inlet or outlet. The inspection opening shall be at least 4" in diameter. The inspection opening shall terminate at or above grade.

Note: See ch. SPS 382 Appendix for further explanatory material.

2. 'Capacity and sizing.' The minimum liquid capacity of a grease interceptor shall be determined in accordance with the provisions of this subdivision, except no grease interceptor may have a capacity of less than 1000 gallons if the interceptor is to discharge to a private onsite wastewater treatment system or less than 750 gallons if the interceptor is to discharge to a municipal sewer system and treatment facility.

a. The minimum capacity of a grease interceptor serving a restaurant with seating shall be equal to C, where

$$C = S \times H \times A$$

where, S = Number of seats, with each drive−in car service space counting as 3 seats and each drive−up service window counting as 60 seats.

H = Hours per day that meals are served, at least 6 hours but not more than 12 hours.

A = Appliance factor:

0.75 for a kitchen with no dishwashing machine and no food waste grinder.

1.0 for a kitchen with either a dishwashing machine or a food waste grinder.

1.25 for a kitchen with both a dishwashing machine and a food waste grinder.

b. The minimum capacity of a grease interceptor serving a dining hall, hospital, nursing home, school kitchen, church kitchen or a kitchen for carryout or delivery service shall be equal to C, where:

$$C = \frac{M \times G \times H}{2 \times P}$$

where, M = Meals served per day.

G = 3 gallons per meal served.

H = Hours per day that meals are served, at least 6 hours but not more than 12 hours.

P = Meal periods per day; 1, 2 or 3.

c. The minimum capacity of a grease interceptor as determined in subd. 2. a. or b. may be halved for establishments with all paper service, but may not be less than 1000 gallons if the interceptor is to discharge to a private sewage system or less than 750 gallons if the interceptor is to discharge to a municipal sewer system and treatment facility.

3. 'Installation.' a. Grease interceptor tanks may not be located within 5 feet of a building or any portion of the building or swimming pool; 10 feet of a water service; 2 feet of a lot line; 10 feet of a cistern or 10 feet of a reservoir or high water mark of a lake, stream, pond or flowage.

Note: The department of natural resources under chs. NR 811 and 812 may require additional setbacks. See ch. SPS 382 Appendix for further explanatory material.

b. Where a grease interceptor tank is installed in groundwater, the tank shall be adequately anchored.

c. Grease interceptor tanks shall be installed on a bedding of at least 3″ in depth. The bedding material shall be sand, gravel, granite, limerock or other noncorrosive materials of a size that all will pass through a $\frac{3}{4}$" sieve.

d. The backfill material for steel and fiberglass grease interceptor tanks shall be as specified in subd. 3. c. for bedding and shall be tamped into place. The backfill material for concrete grease interceptor tanks shall be soil material, of a size that will pass through a 4 inch screen and shall be tamped into place.

e. All joints on concrete risers and manhole covers for a grease interceptor shall be tongue and groove or shiplap type and sealed watertight using neat cement, mortar or bituminous compound. All joints on steel risers for a grease interceptor shall be welded or flanged and bolted and be watertight. All steel manhole extensions from a grease interceptor shall be bituminous coated inside and outside. All methods of attaching fiberglass risers for a grease interceptor shall be watertight and approved by the department.

Note: See ch. SPS 382 Appendix A−382.30 (11) (d) for material reprinted from s. NR 812.08. Section NR 812.08 may have additional setback requirements to wells.

(d) *Interior grease interceptors.* 1. 'Flow rating.' An interior grease interceptor shall be capable of accommodating a flow of at least 15 gallons per minute, but not less than the manufacturer's specifications.

2. 'Flow rate related to connected capacity.' Three−fourths of the total holding capacity in gallons of all fixtures and devices discharging to an interior grease interceptor, shall not exceed the value of the maximum flow rate which the interceptor can accommodate.

3. 'Grease holding capacity as related to flow rate.' The grease holding capacity in pounds shall not be less than double the value of the maximum flow rate which the interceptor can accommodate.

4. 'Flow controls.' Where required by the manufacturer, devices which control the rate of flow through an interior grease intercept shall be installed.

a. The flow control devices shall be accessible for inspection, service and cleaning.

b. Flow controls shall be installed in the drain branch leading to each fixture and shall be so rated that the combined flow from all combinations of discharge will not develop either sufficient static or velocity head so the established flow rate of the interceptor can be exceeded.

Note: See ch. SPS 382 Appendix for further explanatory material.

5. 'Flow control vents.' Orifice type flow controls for an interior grease interceptor shall be vented in accordance with s. SPS 382.31.

6. 'Prohibited locations and types.' No water−cooled grease interceptor may be installed. No grease interceptor may be located where the surrounding temperatures, under operating conditions, are less than 40° F.

7. A maximum of 12 inches of horizontal inlet pipe may be submerged.

(e) *Prohibited treatment.* The introduction of grease or fat emulsifiers into a grease interceptor shall be prohibited.

(6) AUTOMATIC CAR WASHES. The wastes of floor drains and drain inlets of automatic car washes shall discharge through an approved car wash interceptor.

(a) *Design.* Except as provided in subds. 1. and 2. and par. (b), car wash interceptors shall be constructed and installed in accordance with sub. (4) (a) 2.

1. The interceptor's outlet shall be submerged to form a trap with a water seal of at least 15".

2. The bottom of the trap's water seal shall be at least 30" above the bottom of the interceptor.

(b) *Capacity.* The minimum liquid capacity of the interceptor shall be based on the maximum flow rate of water through the interceptor in gallons per minute.

1. Between the waterline and the bottom of the trap seal of the outlet, the interceptor shall have a capacity value equal to at least 5 times the maximum flow rate.

2. Below the bottom of the trap seal of the outlet, the interceptor shall have a capacity value equal to at least 15 times the maximum flow rate.

Note: See ch. SPS 382 Appendix for further explanatory material.

(c) *Hand−held car washing wands.* The wastes of floor drains and drain inlets serving 2 or more hand−held car washing wands shall discharge through an approved car wash interceptor. The wastes of one hand−held car washing wand may discharge to a garage catch basin.

(7) COMMERCIAL LAUNDRIES. Wastes from gravity dump−type clothes washing equipment shall be discharged through an approved laundry interceptor in accordance with this subsection.

(a) *Screening apparatus.* A laundry interceptor shall be equipped with a wire basket or other device which will prevent the passage of solids, ½" or larger in diameter, string, buttons and other detrimental materials into the drain system.

(b) *Trench type interceptors.* A floor receptor, trench or trough as specified in s. SPS 382.33 (9) (c) 3., may serve as a laundry interceptor, if no oils or quantities of sand are discharged into it.

Note: See ch. SPS 382 Appendix for further explanatory material.

(c) *In−line interceptor.* 1. In−line interceptors shall have a minimum inside diameter or horizontal dimension of 24".

2. An in−line interceptor shall be provided with an air−tight cover.

3. An in−line interceptor shall be provided with a vent.

a. The vent shall extend from above the flow line to a vent terminal in accordance with s. SPS 382.31 (16) or shall be connected to the venting system serving the sanitary drain system.

b. The diameter of the vent shall be at least one−half of the diameter of the interceptor's outlet, but not less than 2".

4. The outlet for an in−line interceptor shall be at least 4″ in diameter. The outlet shall be submerged to form a trap with a water seal of at least 12". The bottom of the trap's water seal shall be at least 12" above the bottom of the interceptor.

5. The waterline in an in−line interceptor shall be at least 2" below the bottom of the inlet opening for the interceptor.

(8) OIL AND FLAMMABLE LIQUIDS. Oily and flammable wastewater that discharges to a building sewer shall be intercepted or treated by a means acceptable to the department.

(a) *Site−constructed interceptors.* Site−constructed interceptors shall be designed in accordance with the requirements in sub. (4) (a) 2.

(b) *Prefabricated oil interceptors and separators.* Prefabricated oil interceptors and separators shall be manufactured with adequate capacity for the anticipated load.

(c) *Venting.* Oil and flammable interceptors and separators shall be so designed to prevent the accumulation of explosive gases.

1. A covered interceptor or separator shall be provided with an individual vent of at least 3 inches in diameter. The vent shall extend from the top of the interceptor or separator or as high as possible, from the side of the interceptor or separator to a point at least 12 feet above grade.

2. The drain pipe to the interceptor or separator shall be provided with a fresh air inlet connected within 2 feet of the inlet of the interceptor or separator. The fresh air inlet shall terminate at least one foot above grade, but not less than 6 feet below the terminating elevation of the vent serving the interceptor or separator. The fresh air inlet shall be at least 3 inches in diameter.

Note: See ch. SPS 382 Appendix for further explanatory material.

(9) BOTTLING ESTABLISHMENTS. Wastes containing glass of bottling establishments shall be discharged through an interceptor.

(10) DAIRY PRODUCT PROCESSING PLANTS. Dairy wastes from dairy product processing plants shall be discharged through an interceptor.

(11) MEAT PROCESSING PLANTS AND SLAUGHTERHOUSES. The wastes from meat processing areas, slaughtering rooms and meat dressing rooms shall be discharged through an approved interceptor to prevent the discharge of feathers, entrails, blood and other materials.

(12) SAND INTERCEPTORS. Sand interceptors and other similar interceptors for heavy solids shall be so designed and located as to be accessible for cleaning. The outlet for the interceptor shall be submerged to form a trap with a water seal of at least 12".

(13) PLASTER AND HEAVY SOLIDS TRAP TYPE INTERCEPTORS. Plaster sinks shall be provided with plaster and heavy solids trap type interceptors.

(a) The interceptor shall be installed as the fixture trap.

(b) The drain piping between the sink and the interceptor shall not exceed a length of 36".

Note: See ch. SPS 382 Appendix for further explanatory material.

(14) CHEMICAL WASTE PIPING SYSTEMS. All chemical wastes having a pH level of less than 5.5 or more than 10.0 shall discharge to a holding tank for proper disposal or to a drain system in accordance with this subsection.

(a) *Chemical dilution and neutralizing basins.* 1. All chemical wastes discharging into a drain system shall be diluted, neutralized or treated to a pH level of 5.5 to 10.0 by passing through an approved dilution or neutralizing basin before discharging to a building sewer.

2. Dilution and neutralizing basins shall have the minimum retention capacities in accordance with one of the following requirements:

a. The minimum retention capacity shall be as specified in Table 382.34.

b. The minimum retention capacity shall be as per the manufacturer's specifications.

c. The minimum retention capacity for a quantity exceeding 150 sinks or for special uses or installations shall be approved by the department.

3. Where a sufficient supply of diluting water cannot be provided to a dilution or neutralizing basin, the basin shall be filled with marble or limestone chips of not less than one inch nor more than 3" in diameter to the level of the basin's outlet.

4. Either the inlet or outlet of a dilution or neutralizing basin shall be submerged to form a trap with a water seal of at least 4".

Table 382.34
Minimum Capacities for Dilution and Neutralizing Basins

Maximum Number of Sinks	Minimum Retention Capacity in Gallons
1	5
4	15
8	30
16	55
25	100
40	150
60	200
75	250
100	350
150	500

(b) *Vents.* Vents for chemical waste systems shall be sized and installed in accordance with all of the following:

1. Dilution and neutralizing basins with submerged inlets shall have a sanitary vent connected to the basin and a chemical waste vent connected to the inlet pipe. The pitch and the developed length of the drain between the submerged basin inlet and the chemical waste vent shall be in accordance with Table 382.31−1.

2. Dilution and neutralizing basins with submerged outlets shall have a chemical waste vent connected to the basin and a sanitary vent connected to the outlet pipe. The pitch and the developed length of the drain between the submerged basin outlet and the sanitary vent shall be in accordance with Table 382.31−1.

Note: See ch. SPS 382 Appendix for further explanatory material.

3. The vents for a chemical waste basin shall be sized based on the number of drainage fixture units discharging into the basin and installed in accordance with s. SPS 382.31.

(15) SPECIAL WASTEWATER OR MIXED WASTEWATER TREATMENT OR CONTAINMENT DEVICES. Mixed wastewater treatment and containment devices, decontamination tanks or other special wastewater treatment devices shall discharge to a dispersal or treatment system in accordance with this section or as approved by the department.

Note: A sanitary permit may be required. See ch. SPS 383 for requirements relating to containment tank installation with no valved discharge.

(a) *Installation.* 1. Exterior containment devices or treatment systems for mixed wastewater, decontamination tanks and other special wastewater treatment devices shall not be located within 5 feet of a building or any portion of the building or swimming pool; 10 feet of a water service; 2 feet of a lot line; 10 feet of a clearwater cistern or 10 feet of the high water mark of a lake, stream, pond or flowage.

Note: The department of natural resources under chs. NR 811 and 812 may require additional setbacks. See ch. SPS 382 Appendix for further explanatory material.

2. Exterior containment devices or treatment systems for mixed wastewater, decontamination tanks or other special wastewater treatment devices shall be constructed in accordance with s. SPS 384.25 or as approved by the department.

(b) *Vents*. Vents for mixed wastewater, decontamination tanks and other special wastewater treatment systems shall be sized and installed in accordance with s. SPS 382.31.

(c) *Alarm system*. Containment devices or treatment systems for mixed wastewater, decontamination tanks and other special wastewater treatment devices shall be equipped with an alarm.

(d) *Sampling provision*. Containment devices or treatment systems for mixed wastewater, decontamination tanks and other special wastewater treatment devices shall be equipped to allow the collection of a representative sample.

(e) *Pump requirements.* 1. A discharge line serving a containment tank for servicing purposes shall comply with all of the following:

a. A pipe serving as the discharge line shall be of an acceptable type in accordance with ch. SPS 384.

b. A discharge line shall terminate with a service port consisting of a quick disconnect fitting with a removable plug.

c. The service port of a discharge line shall terminate at least 2 feet above final grade.

d. The service port of a discharge line shall be identified as such with a permanent sign with lettering at least 1/2 inch in height.

e. The service port of a discharge line shall be secured to a permanent support that is capable of withstanding the loads and forces placed on the port.

f. A discharge line shall be at least 3 inches in diameter.

2. Where a lift station is employed for servicing a containment tank, the pump discharge line shall conform with subd. 1., except as provided in subd. 2. a. and b.

a. A discharge line from the lift station shall be at least 2 inches in diameter.

b. The lift station pump shall be activated by means of a keyed−switch at the service port.

(f) *Sizing.* The volume of the mixed wastewater treatment or containment device shall be based on anticipated use.

History: Cr. Register, February, 1985, No. 350, eff. 3−1−85; am. (4) (a) 2. b., (5) (b) 2. intro., c. and (c) 4. b., Register, August, 1991, No. 428, eff. 9−1−91**;** am. (4) (a) 2. c. and g., 3. a., (5) (b) 1. f. and j., 3. a., (c) 1., (8) (a) 2. c., r. and recr. (5) (a) 1., r. (5) (b) 3. e. and (c) (intro.), renum. (5) (b) 3. f. to be (5) (b) 3. e., Register, February, 1994, No. 458, eff. 3−1−94; am. (5) (a) 2. (intro.), 3. and (b) 2. (intro.), Register, April, 2000, No. 532, eff. 7−1−00; am. (4) (b) 2., Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: r. and recr. (1), (2), (4) (a), (8) (a) and (b), am. (3) (intro.), (6) (a) (intro.) and (14) (b) (intro.), renum. (3) (a) to (f) to be (3) (b) to (g), cr. (3) (a) and (14) (b) 3., r. (3) (g), Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. (4) (a) 2. b. and (5) (b) 1. g. Register January 2004 No. 577, eff. 2−1−04; CR 08−055: am. (3) (a) 1., r. and recr. (4) (b) 2. and (14) (a) 2., renum. (5) (intro.) to (d) to be (5) (a) to (e) and am. (5) (a) and (b), cr. (5) (c) 7. Register February 2009 No. 638, eff. 3−1−08; CR 10−064: am. (title), (1), (2), (3) (intro.), (a), (c), (e), (g), (h), (4) (a) 2. f., (5) (c) 3. a., r. (6) (d), cr. (15) Register December 2010 No. 660, eff. 1−1−11; correction in (15) (e) 2. (intro.) made under s. 13.92 (4) (b) 7., Stats., Register December 2010 No. 660; correction in (2), (3) (a) 1., (4) (a) 3. b., c., (5) (b) 2. b., (c) 1. i., (d) 5., (7) (b), (c) 3. a., (14) (a) 2. a., (b) 1., 2., 3., (15) (a) 2., (b), (e) 1. a. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.35 Cleanouts. (1) SCOPE. The provisions of this section set forth the requirements for the installation of cleanouts and manholes for all drain piping.

(2) MATERIALS. Cleanouts shall be constructed of approved materials in accordance with ch. SPS 384.

(3) WHERE REQUIRED. (a) *Horizontal drains.* All gravity horizontal drains within or under a building shall be accessible through a cleanout in accordance with one of the following requirements:

1. The developed length of drain piping between cleanouts for above−ground piping may not exceed 75 feet.

2. The developed length of drain piping between cleanouts for below ground piping 2 inches or less in diameter may not exceed 40 feet.

3. The developed length of drain piping between cleanouts for below ground piping greater than 2 inches in diameter may not exceed 75 feet.

Note: See ch. SPS 382 Appendix for further explanatory material.

(b) *Sanitary building sewers.* 1. Sanitary building sewers 6" 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. Sanitary building sewers 8" or larger in diameter shall be provided with manholes at:

a. Every horizontal change in direction of more than 45 degrees where the change in direction is created within a distance of less than 10 feet;

b. Every change in pipe diameters where both connections are 8 inches or larger; and

c. Intervals of not more than 400 feet.

(c) *Storm building sewers.* 1. Storm building sewers 10" 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" or larger in diameter shall be provided with manholes or storm drain inlets with an inside diameter of at least 36" at:

a. Every horizontal change in direction of more than 45 degrees where the change in direction is created within a distance of less than 10 feet,

b. Every change in pipe diameter where both connections are 12 inches or larger, and

c. Intervals of not more than 400 feet.

(d) *Private interceptor main sewers.* 1. Private interceptor main sewers 5″ or less in diameter shall be provided with an exterior cleanout or manhole upstream of the point of the creation 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″ or larger in diameter shall be provided with a manhole at:

a. The most upstream point of the private interceptor main sewer;

b. Every horizontal change in direction of more than 45 degrees where the change in direction is created within a distance of less than 10 feet,

c. Every change in pipe diameter where both connections are 6 inches or larger, 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.* 1. Except as provided in subd. 2., cleanouts shall be provided in connection with batteries of fixtures at such points that all parts of the branch drain may be accessible for cleaning or removal of stoppages. For the purposes of this requirement, removable fixture traps may serve as cleanout openings.

2. A cleanout shall not be required for a branch drain when the fixtures on the branch include one floor outlet fixture and any fixtures discharging into an accompanying wet vent.

(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" in diameter, unless a stack cleanout is provided in accordance with par. (f).

(j) *Traps and fixture drains.* 1. All traps shall be constructed or installed so that stoppages may be removed from the traps and the horizontal portions of fixture drains.

2. 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 and the horizontal portions of the fixture drain.

(k) *Conductors.* Where a cleanout is provided in a conductor, the cleanout shall be located 28 to 60" 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. See ch. SPS 382 Appendix for further explanatory material.

(m) *Catch basins and interceptors.* The fixture drain from all interceptors designed in accordance with s. SPS 382.34 (4) (a) 2. shall be provided with an accessible cleanout located outside of the basin and not more than 15 inches from the weir of the trap.

(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. All interior and exterior cleanouts where the vertical distance between the horizontal drain pipe being served and the top

of the cleanout opening exceeds 18 inches in length, shall connect to the drain piping through a fitting as specified in Table 382.30–4.

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. SPS 384.30 (2) (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" thick and extending at least 9" from the sleeve on all sides, sloping away from the sleeve.

c. The bottom of the frost sleeve shall terminate 6" to 12" above the top of the drain piping or at least 6" below the predicted frost depth in accordance with s. SPS 382.30 Table 382.30−6.

d. The frost sleeve shall have a removable watertight top of sufficient thickness and strength to sustain the weight of anticipated traffic.

Note: See ch. SPS 382 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 382.35.

Table 382.35

Cleanout Sizes

Diameter of Pipe Served by Cleanout (inches)	Minimum Diameter of Cleanout Extension (inches)	Minimum Diameter of Cleanout Opening (inches)
$1^1/_4$	$1^1/_4$	$1^1/_4$
$1^1/_2$	$1^1/_2$	$1^1/_4$
2	$1^1/_2$	$1^1/_2$
3	3	$2^1/_2$
4	4	$3^1/_2$
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″. A manhole shall have a minimum access opening of 24″.

(b) *Materials.* Manholes shall be constructed of approved materials in accordance with ch. SPS 384 and in accordance with the design provisions of s. NR 110.13.

Note: The provisions of s. 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.

—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 ch. SPS 382 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; am. (5) (a) 2. a., Register, August, 1991, No. 428, eff. 9−1−91; r. and recr. (3) (j) and (5) (a) 2. c., Register, February, 1994, No. 458, eff. 3−1−94; CR 02−002: am. (3) (a) and (d) 1. (intro.), renum. (3) (g) to be (3) (g) 1. and am., cr. (3) (g) 2. and (m), r. and recr. (5) (a) 1. Register April 2003 No. 568, eff. 5−1−03; CR 08−055: r. and recr. (3) (a), am. (3) (b) 2. a., b., (c) 2. a., b., (d) 2. b., c., (5) (a) 1. and Table 82.35 Register February 2009 No. 638, eff. 3−1−09; correction in (2), (3) (m), (5) (a) 1., 2. a., c., (6), (8) (b) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.36 Stormwater and clearwater plumbing systems. (1) SCOPE. The provisions of this section set forth the requirements for the design, installation and maintenance of piping, conveyance, venting, detention and treatment of stormwater and clearwater in plumbing systems.

Note: Refer to ch. NR 151 for stormwater management requirements.

(2) MATERIALS. All stormwater and clearwater plumbing systems shall be constructed of approved materials in accordance with s. SPS 384.30 (3).

(3) DESIGN OF STORMWATER PLUMBING SYSTEMS. (a) Plumbing systems upstream of detention shall be designed, at a minimum, based on the 10−year, 24−hour storm event.

(b) Plumbing detention systems and plumbing systems located downstream of detention shall be designed based on anticipated flows and volumes.

(c) Stormwater and clearwater infiltration systems shall comply with s. SPS 382.365.

Note: For a listing of best management practices (BMPs) refer to ch. SPS 382 Appendix A−382.36 (3)−1.

Note: Where local discharge requirements are more stringent, stormwater plumbing systems may provide detention and treatment to comply with the local stormwater management plan.

(4) DISCHARGE, DISPERSAL, CLEARWATER REUSE OR STORMWATER USE. (a) *Discharge points.* The discharge points for stormwater and clearwater shall be as specified in Table 382.38−1.

(b) *Segregation of wastewater.* 1. Except as provided in subd. 2., stormwater or clearwater piping may not connect to a sanitary drain system.

2. Where a combined sanitary−storm sewer system is available, stormwater, clearwater and sanitary wastewater may be combined in the building sewer.

3. Stormwater gravity drains shall not be combined with clearwater drains prior to discharging to the storm building drain except where approved by the department.

Note: See also Table SPS 382.38−1 which limits clearwater discharges to sanitary sewer at 50 gpd.

Note: For the use of stormwater or reuse of clearwater, refer to the appropriate requirements in ss. SPS 382.30, 382.34, 382.40, 382.41, 382.70 and this section.

Note: For further explanatory material regarding the rational method, other methods and runoff co−efficients, see ch. SPS 382 Appendix A−382.36 (4).

(5) INPUT CALCULATIONS. (a) *Peak flow.* The peak flow of stormwater influent to a plumbing system shall be calculated using any of the following methods:

1. 'Area method.' For sizing of conveyance piping, when calculating stormwater peak flow based on the tributary area, the area in square feet shall be divided by the following applicable divisors:

a. For roofs the divisor is 26 square feet/gpm.

b. For paved or graveled ground surfaces the divisor is 32.5 square feet/gpm.

c. For lawns, parks and similar land surfaces the divisor is 104 square feet/gpm.

Note: For example, 10,000 square feet of roof area/26 square feet/gpm = 385 gpm or 0.85 cubic feet/second.

2. 'Rational method.' For calculating peak flow, the intensity shall be determined using the time of concentration for the tributary area.

Note: For the equation procedure for runoff coefficients for use with the rational method, refer to ch. SPS 382 Appendix A−382.36 (5)−1.

3. 'Engineering analysis method.' An engineering analysis, acceptable to the department, shall be based on the peak flow calculated in accordance with sub. (3) (a).

Note: A model that calculates peak flow such as SWMM, TR−20, TR−55, P8 or an equivalent methodology may be used.

(b) *Volume.* The volume of stormwater influent to a plumbing system shall be based on an engineering design acceptable to the

department and a minimum of a two−year, 24−hour storm event and designed so that no property damage occurs at 100−year, 24−hour storm event with a Type II distribution.

Note: For runoff coefficients and use of other methods or models, refer to ch. SPS 382 Appendix A−382.36 (5)−2 and A−382.36 (5)−3.

Note: The intensity of rainfall varies considerably during a storm as well as geographic regions. To represent various regions of the United States, the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) developed four synthetic 24−hour rainfall distribution types from available National Weather Service (NWS) duration−frequency data (Hershfield 1961; Frederick et al., 1977) or local storm data. Type IA is the least intense and type II is the most intense short duration rainfall. Types I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large 24−hour rainfall amounts. Type II represents the rest of the country, including Wisconsin. For more information, see the USDA−NRCS webpage: http://www.nrcs.usda.gov/.

(c) *Additional inputs to stormwater systems.* Additional inputs to stormwater systems shall be estimated based on anticipated flows and volumes.

(6) CONVEYANCE AND DETENTION SYSTEMS. (a) *Design.* The design of stormwater and clearwater conveyance systems shall conform to all of the following:

1. Horizontal stormwater conveyance piping shall be sized using either of the following:

a. An engineering analysis, based on full flow capacity, acceptable to the department.

b. Tables 382.36−1 to 382.36−5 based on pipe type, diameter and pitch.

2. a. A vertical conductor for stormwater may not be smaller than the largest horizontal branch discharging into the conductor.

b. Vertical conductors shall be sized in accordance with Tables 382.36−1 and 382.36−3 or by an engineering analysis acceptable to the department.

Note: For the use of Baird's equation, refer to ch. SPS 382 Appendix A−382.36 (6)−1.

3. Clearwater conveyance systems shall be sized in accordance with s. SPS 382.30 (3) and (4).

4. Underground, gravity−flow storm building sewers shall have a minimum 3−inch inside diameter.

(b) *Velocity in stormwater conveyance system piping.* The pitch of stormwater conveyance system piping shall be designed to create a minimum velocity of one foot per second when flowing full.

(c) *Fittings and connections.* 1. Except as provided in subd. 2., fittings and connections for stormwater and clearwater conveyance systems shall comply with s. SPS 382.30 (8) and (9).

2. The minimum radius for the first 90° fitting located downstream of a roof drain shall comply with the horizontal to vertical requirements in Table 382.30−4.

(d) *Stack offsets.* Stack offsets for piping of a clearwater conveyance system piping shall comply with s. SPS 382.30 (6).

(e) *Pitch of clearwater gravity conveyance system piping.* 1. The minimum pitch of gravity conveyance system piping having a 2−inch inside diameter or less shall be 1/8 inch per foot.

2. The minimum pitch of clearwater gravity conveyance system piping having at least a 3−inch inside diameter or more shall be 1/16 inch per foot.

(f) *Branch connections near base of stack.* Branch drains from interior clearwater inlets may not connect downstream from the base fitting or fittings of a drain stack within a distance equal to 20 pipe diameters of the building drain.

(g) *Detention systems.* 1. The storage volume of a dry detention system shall be designed and installed with a drain time of 72 hours after a storm event.

2. Paved surfaces or parking lots serving as detention areas shall be limited to a design depth of 6 inches, unless otherwise limited by local ordinance.

3. By design, ground surface ponding shall drain within 24 hours after a storm event.

Table 382.36−1

Maximum Capacity of Stormwater Conveyance Piping for PVC, ASTM D1785, D2665, F891 and ABS, ASTM D1527, D2661, F628

Nominal Pipe Size (in inches)	Maximum Capacities in gallons per minute (gpm)					
	Pitch of Piping Per Foot					
	1/32 inch (0.26% slope)	1/16 inch (0.52% slope)	1/8 inch (1.04% slope)	¼ inch (2.08% slope)	½ inch (4.16% slope)	Vertical
3	30	40	60	80	110	89
4	60	80	120	160	230	183
5	110	150	210	300	420	334
6	170	240	340	480	690	545
8	360	510	710	1,010	1,430	1,133
10	660	930	1,310	1,850	2,620	2,079
12	1,050	1,480	2,090	2,960	4,180	3,316
14	1,350	1,900	2,690	3,810	5,390	4,271
16	1,920	2,720	3,840	5,440	7,690	6,097
18	2,630	3,720	5,270	7,440	10,520	8,348
20	3,520	4,970	7,030	9,956	14,060	11,155
24	5,750	8,140	11,490	16,260	22,990	18,244

Note: To convert to cubic feet per second (cfs) divide gpm by 448.8.

Table 382.36−2

Maximum Capacity of Stormwater Horizontal Conveyance Piping for PVC, ASTM D3034

Nominal Pipe Size (in inches)	Maximum Capacities in gallons per minute (gpm)				
	Pitch of Piping Per Foot				
	1/32 inch (0.26% slope)	1/16 inch (0.52% slope)	1/8 inch (1.04% slope)	¼ inch (2.08% slope)	½ inch (4.16% slope)
4	60	80	110	160	220

6	160	230	320	450	640
8	350	490	700	990	1,400
10	630	900	1,270	1,790	2,540
12	1,010	1,430	2,020	2,850	4,040
15	1,730	2,450	3,460	4,900	6,920

Note: To convert to cubic feet per second (cfs) divide gpm by 448.8.

Table 382.36−3

Maximum Capacity of Stormwater Conveyance Piping for Cast Iron, ASTM A74 and ASTM A888

Nominal Pipe Size (in inches)	Maximum Capacities in Gallons Per Minute (gpm)					
	Pitch of Piping Per Foot					
	1/32 inch (0.26% slope)	1/16 inch (0.52% slope)	1/8 inch (1.04% slope)	¼ inch (2.08% slope)	½ inch (4.16% slope)	Vertical
3	20	30	40	60	80	80
4	50	60	90	130	180	173
5	80	120	170	230	330	315
6	140	190	270	380	540	516
8	290	420	590	830	1,170	1,118
10	540	770	1,090	1,540	2,170	2,068
12	870	1,230	1,740	2,490	3,490	3,318
15	1,630	2,310	3,270	4,620	6,530	6,217

Note: To convert to cubic feet per second (cfs) divide gpm by 448.8.

Table 382.36−4

Maximum Capacity of Stormwater Horizontal Conveyance Piping for Concrete, ASTM C76 and ASTM C14

Nominal Pipe Size (in inches)	Maximum Capacities in gallons per minute (gpm)				
	Pitch of Piping Per Foot				
	1/32 inch (0.26% slope)	1/16 inch (0.52% slope)	1/8 inch (1.04% slope)	¼ inch (2.08% slope)	½ inch (4.16% slope)
4	40	60	90	120	170
6	130	180	260	360	510
8	280	390	550	780	1,110
10	500	710	1,000	1,420	2,010
12	820	1,150	1,630	2,310	3,260
15	1,480	2,090	2,960	4,180	5,910
18	2,400	3,400	4,810	6,800	9,620
21	3,630	5,130	7,250	10,260	14,500
24	5,180	7,320	10,350	14,640	20,710
27	7,090	10,020	14,170	20,050	28,350
30	9,390	13,270	18,770	26,550	37,550
33	12,100	17,120	24,210	34,230	48,410
36	15,260	21,590	30,530	43,170	61,060
39	18,900	26,720	37,790	53,440	75,580
42	23,020	32,560	46,050	65,120	92,100
48	32,870	46,490	65,740	92,980	131,490
54	45,000	63,640	90,010	127,290	180,010
60	59,600	84,290	119,200	168,580	238,410

Note: To convert to cubic feet per second (cfs) divide gpm by 448.8.

Table 382.36−5
Maximum Capacity Of Stormwater Horizontal Conveyance Piping For Elliptical Reinforced Concrete Pipe

Pipe Diameters in inches (circular pipe equivalent)	Maximum Capacities in gallons per minute (gpm)			
	Pitch of Piping Per Foot			
	1/16 inch (0.52% slope)	1/8 inch (1.04% slope)	¼ inch (2.08% slope)	½ inch (4.16% slope)
14 X 23 (18)	3,300	4,675	6,700	9,500
19 X 30 (24)	7,200	10,060	14,700	21,000
24 X 38 (30)	13,250	18,740	26,500	37,475
29 X 45 (36)	21,545	30,475	43,095	60,940
34 X 53 (42)	32,500	45,965	65,000	91,925
38 X 60 (48)	46,405	65,625	92,800	131,245
43 X 68 (54)	63,525	89,840	127,050	179,800
48 X 76 (60)	84,135	118,985	168,270	237,965

(7) OTHER DESIGN REQUIREMENTS. (a) *Subsoil drains.* 1. A subsoil drain discharging to a plumbing system shall discharge into an area drain, manhole or storm sewer, trapped receptor or a sump with a pump.

2. Where a foundation drain is subject to backwater, the drain shall be protected by a backwater valve or a sump with a pump.

(b) *Backwater valve.* All backwater valves shall be accessible for maintenance.

(c) *Sewer location.* 1. No storm building sewer or private interceptor main storm sewer may pass through or under a building to serve another building, unless one of the following conditions is met:

a. The storm building sewer or private interceptor main storm sewer serves farm buildings or farm houses, or both, that are located on one property.

b. Where a storm building sewer or private interceptor main storm sewer serves buildings that are located on one property, a document that indicates the piping and distribution arrangement for the property and buildings is recorded with the register of deeds no later than 90 days after installation.

2. The location of storm building drains and building sewers shall comply with ss. SPS 382.30 (11) (d) and 382.40 (8) (b) 7.

(d) *Installation requirements.* 1. The connection of a stormwater leader discharging to a storm building sewer shall be made above the finished grade.

Note: For more information regarding joints and connections, refer to s. SPS 384.40.

2. The elevation of a storm building drain shall comply with s. SPS 382.30 (11) (b) 1.

3. Interior inlets and drains subject to backflow or backwater shall be protected with a check valve or backwater valve.

4. Storm building drains and building sewers shall be installed to comply with s. SPS 382.30 (11) (e).

5. Storm building sewer connections to public sewers shall be in accordance with s. SPS 382.30 (11) (f).

6. Cleanouts for conveyance system piping shall be installed in accordance with s. SPS 382.35.

7. Storm building sewers that receive clearwater and that may be subject to freezing shall be installed in accordance with s. SPS 382.30 (11) (c) 2.

8. Storm building drains, clearwater building drains, and building storm sewers and appurtenances shall be separated from water wells by the applicable separation distances contained in chs. NR 811 and 812, or as otherwise permitted by the department of natural resources.

9. All underground stormwater storage tanks for water reuse shall be separated from sanitary sewers by a minimum of 8 feet.

10. a. A means to locate buried non−metallic storm building sewers and private interceptor main sewers that discharge to municipal mains shall be provided in accordance with the options under s. SPS 382.30 (11) (h), except as provided in subd. 10. b.

b. Tracer wire insulation color for non−metallic storm pipe shall be brown.

(8) SUMPS AND PUMPS. (a) *Sumps.* 1. 'General.' All storm building subdrains shall discharge into a sump, the contents of which shall be automatically lifted and discharged, dispersed or used in accordance with sub. (4).

2. 'Construction and installation'. a. Except as provided in subd. 2. c. and d., an interior sump shall have a rim extending at least one inch above the floor immediately adjacent to the sump.

b. A sump shall have a removable cover of sufficient strength for anticipated loads.

c. Where a sump is installed in an exterior meter pit or elevator pit, the rim may be level with the floor.

d. When a sump is provided with an airtight, solid cover.

3. 'Location'. All sumps installed for the purpose of receiving clearwater, groundwater or stormwater shall be separated from water wells by the applicable separation distances contained in chs. NR 811 and 812, or as otherwise permitted by the department of natural resources.

Note: See ch. SPS 382 Appendix A−382.30 (11) (d) for material reprinted from s. NR 812.08.

4. 'Size'. a. Except as permitted under subd. 4. b. or c. the size of each sump shall be no smaller than 16 inches in diameter at the top, 14 inches in diameter at the bottom, and 22 inches in depth.

b. The minimum sump diameter may be smaller than 16 inches when specified by the manufacturer for a combination sump and pump.

c. A sump located in an elevator pit may have a width or diameter of not less than 12 inches and a depth of not less than 12 inches.

(b) *Pumps.* 1. 'Size.' The pump shall be of a capacity appropriate for the anticipated use.

2. 'Discharge piping.' a. Where a pump discharges into a storm drain system, a check valve shall be installed.

b. The minimum diameter discharge piping shall be based on the design flow rate of the pump and a minimum velocity of one foot/second.

(9) INLET REQUIREMENTS. (a) *Interior clearwater drain inlets.* Interior clearwater drain inlets shall terminate at least one inch above the finished floor.

(b) *Exterior stormwater inlets.* 1. 'Construction.' a. All exterior stormwater inlets shall be constructed of material in accordance with s. SPS 384.30.

Note: For additional information on approved materials, refer to s. SPS 384.30 (3) (f).

b. All exterior stormwater inlets subject to vehicular traffic shall be set on a suitable base capable of sustaining the anticipated load.

2. 'Design'. All exterior stormwater inlets shall be designed for the anticipated flow.

Note: For manhole requirements, refer to s. SPS 382.35 (3).

3. 'Inlet grates'. a. General. All inlets shall be provided with a well−fitted, removable grate of a thickness and strength to sustain the anticipated loads.

Note: Sections SPS 362.1101 to 362.1110 specify that for floor or ground surface inlets when placed within an identifiable accessible route, openings in the floor or ground surface shall be of a size that does not permit the passage of a ½−inch sphere. Also, it states that grates having elongated openings be placed so that the longest dimension is perpendicular to the dominant direction of travel.

b. Floor or ground surface inlets. Openings in the floor or ground surface shall be of a size that prohibits the entrapment of wheeled vehicles, wheelchairs or pedestrians within the grate openings.

c. Grates on horizontal pipes. Grates shall be provided on horizontal inlets greater than 6 inches in diameter. The grates shall be placed so that the rods or bars are not more than 3 inches downstream of the inlet. Rods or bars shall be spaced so that the openings do not permit the passage of a 6−inch sphere.

Note: See ch. SPS 382 Appendix for further explanatory material.

(c) *Subsurface areas of 50 square feet or less.* Other than stairwells, all subsurface areas not exceeding 50 square feet and exposed to the weather, shall comply with one of the following:

1. Drain to foundation drains through a minimum 2−inch diameter pipe or a through a continuous layer of washed stone aggregate.

2. Drain to the storm building drain, storm subdrain or storm sewer through a minimum 3−inch diameter pipe.

(d) *Subsurface areas of more than 50 square feet and stairwells.* An area drain shall be provided in subsurface areas greater than 50 square feet and in all stairwells exposed to the weather. The area drain shall comply with all of the following:

1. Drain to the storm building drain, storm subdrain or storm sewer.

2. The fixture drain shall have a minimum 3−inch inside diameter and may not discharge into a subsoil or foundation drain.

(10) 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 1.5 times the area of the conductor to which the drain connects.

(b) *Flat decks.* Roof drain strainers used on sun decks, open parking decks and similar areas shall be of the flat surface type, shall be level with the deck and shall have an available inlet area of not less than 2 times the area of the conductor to which the drain connects.

(11) SECONDARY ROOF DRAINS. (a) *Sizing.* When secondary roof drain systems are installed the secondary system shall be sized and installed in accordance with the requirements in this section.

(b) *Prohibited connection.* Secondary roof drain systems may not be connected to primary roof drain systems.

(c) *Discharge.* All secondary roof drain systems shall discharge in accordance with Table 382.38–1.

(12) TRAPS AND VENTS. (a) *Traps.* 1. Traps are required for interior drain inlets receiving clearwater.

2. Except for exterior loading dock drains, traps are required for exterior drain inlets located within 10 feet of an air inlet, door or openable window.

3. More than one drain inlet may discharge to the same trap.

4. A foundation drain that discharges by gravity to a storm sewer shall be trapped. The trap shall be provided with cleanouts.

(b) *Vents.* 1. A trap receiving clearwater shall be vented in accordance with s. SPS 382.31. Vent piping for a clearwater drain system may not be connected to a vent system serving a sanitary drain system or chemical waste system.

2. a. Vents serving a solid covered sump shall terminate a minimum of one inch above finished floor.

b. Sump vents shall be sized as per Table 382.31−4.

(13) OPERATION AND MAINTENANCE. (a) *Plan.* An operation and maintenance plan shall be implemented for all stormwater plumbing systems for drainage areas of one or more acres that are installed on or after December 1, 2004.

(b) *Plan information.* An operation and maintenance plan as required in par. (a) shall include at least all of the following information, applicable to the system:

1. Accumulated solids or byproduct removal requirements.

2. Identification of safety hazards.

3. Cleaning and inspection schedule.

4. Inspection and maintenance checklist, including at least the following items:

a. Filters.

b. Disinfection units.

c. Sedimentation chambers.

d. Detention devices.

e. Infiltration systems.

5. Start up and shutdown procedures.

6. Vector control requirements.

7. A contingency plan in the event of system failure.

(c) *Plan location.* The operation and maintenance plan shall remain onsite and be available for inspection when requested by the department.

(d) *Record of maintenance.* When requested the owner shall make available for inspection all maintenance records to the department or agent for the life of the system.

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; renum. (13) (a) and (b) to be (b) and (c) and am. (b) 1., cr. (3) (b) 3. and (13) (a), r. (3) (c) 3. and (13) (intro.), Register, August, 1991, No. 428, eff. 9−1−91; reprinted to correct error in (5) (e) 2., Register, October, 1991, No. 430; am. (3) (b) 1., (c) 1. a., (13) (b) 1. and (c), cr. (11) (a) 5., Register, February, 1994, No. 458, eff. 3−1−94; r. and recr. (11) (a) 2. and 5., Register, April, 1998, No. 508, eff. 5−1−98; renum. and am. (3) (b) 3. a. to be (3) (b) 3. and (3) (b) 3. b. to be (3) (b) 4., Register, April, 2000, No. 532, eff. 7−1−00; am. (3) (b) 3., (4) (a), (5) (a) and (6) (a), cr. (3) (b) 5. and Table 82.36−4a, Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: r. and recr. (3), (11) (a) 3., (13) (a) 2., (15) (a) and (b), am. (5) (e) (intro.), (10), (12), (14) and Table 82.36−4 Register April 2003 No. 568, eff. 5−1−03; CR 04−035: r. and recr. Register November 2004 No. 587, eff. 12−1−04; CR 07−069: cr. (7) (d) 10. Register February 2008 No. 626, eff. 3−1−08; CR 08−055: am. (4) (b) 3. and (8) (a) 4., r. and recr. (11) Register February 2009 No. 638, eff. 3−1−09; correction in (2), (3) (c), (4) (a), (6) (a) 1. b., 2. b., 3., (c) 1., 2., (d), (7) (c) 2., (d) 2., 4., 5., 6., 7., 10. a., (9) (b), (11), (c), (12) (b) 1., 2. b. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.365 Stormwater and clearwater subsurface infiltration plumbing systems. (1) SCOPE. The provisions of this section set forth the requirements for the design, installation and maintenance of stormwater and clearwater subsurface infiltration plumbing systems serving building sites.

Note: The department of natural resources has registration requirements for class V injection wells. See ch. SPS 382 Appendix for further explanatory material.

(2) SITE AND SOIL EVALUATION. (a) *Site evaluation.* A site evaluation shall be conducted in accordance with the methods and standards as provided in s. SPS 385.40 (3) (a).

(b) *Soil evaluation.* 1. A soil evaluation shall be conducted in accordance with the methods and standards as provided in s. SPS 385.30 (1) (c).

2. Individuals qualified to conduct soil evaluation under this subsection shall be an individual that maintains either a registration as provided in s. SPS 305.33 or a license as provided in ch. GHSS 4.

(3) INFILTRATION SYSTEM DESIGN. (a) *Influent quality.* For stormwater and clearwater infiltration plumbing systems, the influent quality shall comply with the requirements in Table 382.70−1 for subsurface infiltration and irrigation.

(b) *In situ soil requirements.* 1. Except as provided in subd. 2., the minimum depth of suitable in situ soil for infiltration systems shall be as specified in Table 382.365−1 to separate the system from the highest groundwater elevation or bedrock. When groundwater mounding calculations affect the depth to seasonal groundwater, the depth of suitable soil shall be measured to the calculated elevation of mounded groundwater.

2. For roof runoff or where treatment has afforded an equivalent level of water quality, the depth of in situ soil shall be no less than one foot of materials finer than coarse sand.

Note: See ch. SPS 382 Appendix for representative water quality levels.

Table 382.365−1
Depth of Suitable Soils by USDA Soil Texture and Percent Fines of the Infiltrative Surface

Soil Texture	Minimum 5 ft. of Suitable Soil Separation and ≥10% but <20% Fines [a]		Minimum 3 ft. of Suitable Soil Separation and ≥20% Fines [a]	
	Texture Suitability	Maximum Rock Fragment Content [b]	Texture Suitability	Maximum Rock Fragment Content [b]
Sands				
COS	NP [c]	−−	NP	−−
S	NP [c]	−−	NP [c]	−−
FS	NP [c]	−−	NP [c]	−−
VFS	X	NP [c] > 60%	X	NP [c] > 20%
Loamy sands				
LCOS	X	NP [c] > 0%	NP [c]	−−
LS	X	NP [c] > 0%	NP [c]	−−
LFS	X	NP [c] > 0%	NP [c]	−−
LVFS	X	NP [c] > 82%	X	NP [c] > 63%
Sandy loams				
COSL	X	NP [c] > 56%	X	NP [c] > 13%
SL	X	NP [c] > 56%	X	NP [c] > 13%
FSL	X	NP [c] > 56%	X	NP [c] > 13%
VFSL	X	NP [c] > 74%	X	NP [c] > 47%
Loam (L)	X	NP [c] > 79%	X	NP [c] > 58%
Silt Loam (SIL)	X	NP [c] > 84%	X	NP [c] > 68%
Silt (SI)	X	NP [c] > 88%	X	NP [c] > 75%
Clay Loams				
SCL	X	NP [c] > 71%	X	NP [c] > 43%
SICL	X	NP [c] > 88%	X	NP [c] > 75%
CL	X	NP [c] > 81%	X	NP [c] > 63%
Clays				
SC	X	NP [c] > 78%	X	NP [c] > 56%
SIC	X	NP [c] > 88%	X	NP [c] > 75%
C	X	NP [c] > 82%	X	NP [c] > 63%

NP = Not permitted.
X = Suitable for use under the specified conditions.
[a] Fines are mineral particles passing a 200 mesh sieve (less than 0.075mm). Content is measured by weight.
[b] Rock fragments are unattached pieces of rock 2 mm in diameter or larger. Content is measured by volume.
[c] Permitted only where laboratory analysis provides evidence of percent fines required.

USDA Soil Texture Abbreviations:

COS = Coarse Sand
S = Sand
LCOS = Loamy Coarse Sand
LS = Loamy Sand
LFS = Loamy Fine Sand
LVFS = Loamy Very Fine Sand
COSL = Coarse Sandy Loam
SL = Sandy Loam
FSL = Fine Sandy Loam
VFSL = Very Fine Sandy Loam
L = Loam
SIL = Silt Loam
SI = Silt
SCL = Sandy Clay Loam
SICL = Silty Clay Loam
CL = Clay Loam
SC = Sandy Clay
SIC = Silty Clay
C = Clay

(c) *Hydraulic application rates.* The maximum hydraulic application rate for stormwater and clearwater subsurface infiltration plumbing systems shall be in accordance with one of the following methods.

1. The maximum hydraulic application rate shall be determined by soil analysis in accordance with sub. (2) (b) and Table 382.365−2.

2. The maximum hydraulic application rate shall be determined by field measurement using a nationally−accepted method and the correction factor as determined using Table 382.365−3. To determine the maximum hydraulic application rate, the measured infiltration rate at the infiltrative surface shall be divided by the correction factor as listed in Table 382.365−3.

Table 382.365−2
Design Infiltration Rates For Soil Textures Receiving Stormwater

Soil Texture [a]	Design Infiltration Rate Without Measurement inches/hour [b]
Coarse sand or coarser	3.60
Loamy coarse sand	3.60
Sand	3.60
Loamy sand	1.63
Sandy loam	0.50
Loam	0.24
Silt loam	0.13
Sandy clay loam	0.11
Clay loam	0.03
Silty clay loam	0.04 [c]
Sandy clay	0.04
Silty clay	0.07
Clay	0.07

[a] Use sandy loam design infiltration rates for fine sand, loamy fine sand, very fine sand, and loamy fine sand soil textures.

[b] Infiltration rates represent the lowest value for each textural class presented; based on Rawls et al., 1998 [Use of Soil Texture, Bulk Density and Slope of Water Retention Curve to Predict Saturated Hydraulic Conductivity, ASAE, Vol. 41(2), pp. 983−988].

[c] Infiltration rate is an average, based on Rawls et al., 1982 (Estimation of Soil Water Properties, Transactions of the American Society of Agricultural Engineers Vol. 25, No. 5 pp. 1316 –1320 and 1328) and Clapp & Hornberger, 1978 (Empirical equations for some hydraulic properties. Water Resources Research 14:601−604).

Table 382.365−3
Total Correction Factors Divided Into Measured Infiltration Rates

Ratio of Design Infiltration Rates [a]	Correction Factor
1	2.5
1.1 to 4.0	3.5
4.1 to 8.0	4.5
8.1 to 16.0	6.5
16.1 or greater	8.5

[a] Ratio is determined by dividing the design infiltration rate from Table 382.365−2 for the textural classification at the bottom of the infiltration device by the design infiltration rate from Table 382.365−3 for the textural classification of the least permeable soil horizon. The least permeable soil horizon used for the ratio should be within five feet of the bottom of the device or to the depth of the limiting layer.

(d) *Groundwater mounding.* Groundwater mounding consideration shall be included in the design of any stormwater and clearwater subsurface infiltration plumbing system that has a width that exceeds 15 feet and a depth to the estimated highest groundwater elevation.

Note: An acceptable model is provided by the USGS, webpage: http://water.usgs.gov/ogw/techniques.html.

(e) *Drain down time.* 1. Stormwater and clearwater subsurface infiltration plumbing systems shall be designed to drain within 72 hours after a storm event.

2. By design, ground surface ponding shall drain within 24 hours after a storm event.

(f) *Setbacks.* 1. Stormwater and clearwater subsurface infiltration plumbing systems shall be located as provided in Table 382.365−4, except for irrigation systems.

Table 382.365−4
Horizontal Setback Parameters by Physical Feature

Physical Feature	Setback Parameters in feet
Building	10
Holding tank, stormwater collection tank	10
POWTS dispersal component	5
POWTS holding or treatment component	10
Property line	5
Swimming pool, in ground	15

2. All stormwater and clearwater subsurface infiltration plumbing systems shall be separated from water wells by the applicable separation distances contained in chs. NR 811 and 812 or as otherwise approved by the department of natural resources.

Note: See ch. SPS 382 Appendix A−382.30 (11) (d) for material reprinted from ss. NR 811.12 (5) (d) and 812.08. Section NR 811.12 (5) (d) or 812.08 may have additional setback requirements.

(4) INSTALLATION. (a) *Orientation.* Except for subsurface irrigation systems, all of the following shall apply:

1. The longest dimension of a stormwater or clearwater subsurface infiltration plumbing system consisting in part of in situ soil shall be oriented along the surface contour of the site location, unless otherwise approved by the department.

2. The infiltrative surface of a stormwater or clearwater subsurface infiltration plumbing system consisting in part of in situ soil and located below the surface of the original grade shall be level.

(b) *Other requirements.* 1. A stormwater or clearwater subsurface infiltration plumbing system consisting in part of in situ soil may not be installed if the soil is frozen at the infiltrative surface.

2. Snow cover shall be removed before excavating or installing a stormwater or clearwater system component consisting in part of in situ soil.

3. For a stormwater or clearwater subsurface infiltration plumbing system consisting in part of in situ soil, the soil moisture content shall be evaluated immediately prior to installation of the component. If the soil evaluation at the infiltrative surface results in the sample capable of being rolled into a ¼ –inch wire, the installation may not proceed.

Note: To accomplish a field test for soil wetness, a soil sample the size of one's palm may be rolled to form at least a ¼−inch wire.

4. All vessels and pipes of a stormwater or clearwater subsurface infiltration plumbing system shall be bedded in accordance with a product approval under s. SPS 384.10 or a plan approval under s. SPS 382.20.

(5) OPERATION AND MAINTENANCE. (a) *General.* Operation and maintenance shall be performed in accordance with the operation and maintenance plan submitted with the stormwater and clearwater subsurface infiltration plumbing system design and s. SPS 382.36 (13), where applicable.

(b) *Prohibited substance.* 1. Except as provided in subd. 2., no substance shall be discharged into a stormwater or clearwater subsurface infiltration plumbing system that results in exceeding the enforcement standards and preventive action limits specified in ch. NR 140 Tables 1 and 2 at a point of standards application, pursuant to s. 160.21 (2), Stats.

Note: For groundwater standard limits on various substances, refer to ch. NR 140 Table 1.

2. Pursuant to s. 160.19 (2) (a), Stats., the department has determined that it is not technically or economically feasible to require that a stormwater or clearwater subsurface infiltration plumbing system treat wastewater to comply with the preventive action limit for chloride specified in ch. NR 140 Table 2, as existed on June 1, 1998.

Note: Section 160.19 (2) (a), Stats., reads: "Each regulatory agency shall promulgate rules which define design and management practice criteria for facilities, activities and practices affecting groundwater which are designed, to the extent technically and economically feasible, to minimize the level of substances in groundwater and to maintain compliance by these facilities, activities and practices with preventive action limits, unless compliance with the preventive action limits is not technically and economically feasible."

3. Pursuant to s. 160.21 (2), Stats., the point of standards application relative to the performance of stormwater and clearwater subsurface infiltration plumbing systems is any of the following:

a. Any point of present groundwater use for potable water supply.

b. Any point beyond the boundary of the property on which the facility, practice or activity is located.

(c) *Deleterious substance.* Substances deleterious to a stormwater or clearwater subsurface infiltration plumbing system shall be intercepted, diluted or treated in accordance with s. SPS 382.34 prior to the substance discharging into a stormwater or clearwater infiltration system.

History: CR 04−035: cr. Register November 2004 No. 587, eff. 12−1−04; correction in (2) (a), (b) 1., 2., (3) (a), (b) 1., (c) 1., 2., (f) 1., (4) (b) 4., (5) (a), (c), Table 382.365−3 made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.37 Sanitation facilities and campgrounds.

(1) COMPOSTING SYSTEMS. (a) Composting systems which employ water or other liquids as a transport medium for wastes shall conform with this subsection.

Note: Composting systems where water or other liquids are not employed as a transport medium are addressed under ch. SPS 391.

(b) The materials, design, construction and performance of a composting system which employs water or other liquids as a transport medium for wastes shall conform to NSF Standard 41.

(c) All composting systems shall be listed by a testing agency acceptable to the department.

Note: For a listing of agencies acceptable to the department, see ch. SPS 382 Appendix A−384.11.

(d) 1. Components for the storage or treatment of wastes shall be continuously ventilated.

2. Ventilation ducts or vents for the composting system shall conform to s. SPS 382.31 (16).

(e) 1. The disposal of the end product from a composting system shall be in accordance with 40 CFR Part 503, Standards for the Use or Disposal of Sewage Sludge.

Note: EPA materials relating to EPA 503, including, "Domestic Septage Regulatory Guidance: A Guide to the EPA 503 Rule", are available from the Office of Water Resource, US EPA, 401 M Street SW, Washington D.C. 20460.

2. The disposal of any liquid from a composting system shall be either to a publicly owned treatment works or a POWTS conforming to ch. SPS 383.

(f) The connection of potable water supplies to a composting system shall be protected in accordance with s. SPS 382.41.

(g) The drainage systems for the composting system shall conform to the applicable requirements of ss. SPS 382.30 to 382.36 and the manufacturer's specifications.

(2) SANITARY DUMP STATIONS. (a) Sanitary dump stations which are used to receive domestic wastes and domestic wastewater from the holding tanks of travel trailers, recreational vehicles or other similar mobile vehicles, and transfer containers shall conform with this subsection.

Note: See ch. SPS 382 Appendix A−382.37 (2) for further explanatory material.

(b) The drain receptor for a sanitary dump station shall be at least 4″ in diameter.

(c) 1. The drain receptor shall be provided with a self−closing cover.

2. The cover for the drain receptor shall be operable without touching the cover with one's hands.

(d) The drain receptor shall be surrounded by an impervious pad at least 6 feet in diameter. The pad shall be:

1. Pitched toward the drain receptor with a minimum slope of ¼″ per foot; and

2. Of sufficient strength to sustain anticipated loads.

(e) The drain receptor shall be trapped in accordance with s. SPS 382.32.

(f) The drain receptor for a sanitary dump station that is installed within an enclosed structure shall be vented in accordance with s. SPS 382.31.

(g) A supply of water shall be provided to wash down the drain receptor and pad. The water supply shall be:

1. Provided with cross connection control in accordance with s. SPS 382.41; and

2. Labeled indicating that the supply is not for drinking purposes.

(h) 1. Aboveground drains shall be constructed of approved materials in accordance with s. SPS 384.30 (2) (a).

2. Aboveground water supply piping shall be constructed of approved materials in accordance with s. SPS 384.30 (4) (e).

(3) CAMPGROUNDS. (a) *Drain systems.* Sewers serving campgrounds shall comply with the provisions in s. SPS 382.30 and all of the following:

1. A drain line serving a recreational vehicle shall discharge to a minimum 4−inch diameter campsite receptor by means of an indirect waste pipe.

2. One campsite receptor shall be designed to serve no more than 4 recreational vehicles.

3. Where 2 or more drain lines are designed to discharge into the same campsite receptor, an increaser shall be installed in the vertical portion of the trap riser to accommodate the drains.

4. The rim of a campsite receptor shall terminate no less than 4 inches above the finished grade.

5. The rim of a campsite receptor shall not terminate at an elevation that is higher than the water supply termination serving the same site.

6. A vent is not required to serve the trap serving a campsite receptor.

7. When not in use, a campsite receptor shall be capped.

(b) *Water supply systems.* Water supply systems serving campgrounds shall comply with the provisions in s. SPS 382.40 and all of the following:

1. An accessible control valve shall be installed at the most upstream point of the campground water supply distribution system and downstream of the municipal meter or pressure tank.

2. If water is provided to a campsite, individual approved backflow protection shall serve each hose connection in accordance with s. SPS 382.41.

3. A campsite water supply riser shall terminate no less than 18 inches above finished grade.

Note: See ch. SPS 382 Appendix for further explanatory material.

History: Cr. Register, April, 2000, No. 532, eff. 7−1−00; CR 02−002: cr. (2) (h) and (3) Register April 2003 No. 568, eff. 5−1−03; CR 08−055: am. (3) (b) 3. Register February 2009 No. 638, eff. 3−1−09; correction in (1) (d) 2., (e) 2., (f), (g), (2) (e), (f), (g) 1., (h) 1., 2., (3) (a) (intro.), (b) (intro.), 2. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.38 Discharge points.

(1) PURPOSE. The purpose of this section is to establish allowable discharge points for wastewater discharging from plumbing systems.

(2) SCOPE. The provisions of this section set forth the requirements for the discharge points for wastewater based on the use of the fixtures, appurtenances, appliances and devices discharging into the plumbing system.

(3) GENERAL REQUIREMENTS. (a) Wastewater from plumbing systems shall be discharged as specified in Table 382.38−1.

(b) Wastewater from uses other than those listed in Table 382.38−1, shall be discharged as specified by the department on a site−specific basis.

Table 382.38 – 1

Allowable Discharge Points by Fixture or Specific Uses

Use or Fixture	Allowable Discharge Points					
	POWTS[a]	**Municipal Sanitary Sewer**	**Municipal Storm Sewer**	**Ground Surface**	**Combined Sanitary−Storm Sewer**	**Subsurface Dispersal [i]**
1. Cross connection control device or assembly [see s. SPS 382.33 (9) (i)]	X	X		X [b, c,e]	X	
2. Domestic wastewater	X	X			X	
3. Condensate from high efficiency furnace or water heater	X	X			X	
4. Drinking fountain	X	X	X	X [b]	X	X
5. Elevator pit drain [see s. SPS 382.33 (9) (f)]			X	X [b]	X	X
6. Enclosed public parking levels	X	X		X [b]	X	X
7. Industrial wastewater [h]	X[f]	X			X	
8. Municipal well pump house floor drain and sink	X	X		X [b]	X	X
9. One− and 2−family garage floor area [see s. SPS 382.34 (4) (b)]	X	X		X [b]	X	
10. Residential living unit air conditioner condensate	X	X [g]	X [c]	X [b]	X	X
11. Storm water, groundwater, fire sprinkler test discharge and clear water	X	X [g]	X [c]	X [b]	X	X
12. Secondary roof drain systems				X [j]		
13. Swimming pool or wading pool — diatomaceous earth filter backwash	X	X			X	
14. Swimming pool or wading pool — drain wastewater	X	X [b]	X [b,c]	X [b,c]	X [b]	X
15. Swimming pool or wading pool — sand filter backwash	X	X [b]	X [b,c]	X [b,c]	X [b]	X
16. Water heater temperature and pressure relief valve [see s. SPS 382.40 (5)]	X	X	X	X [b]	X	X
17. Wastewater from water treatment device	X	X	X [c]	X [b,c]	X	X
18. Whirlpool backwash drain and wastewater	X	X	X [c]	X [b,c]	X	
19. Discharges not specifically listed above	Contact the department					

[a] Allowed when the POWTS is designed to include designated wastewater.

[b] Unless prohibited by local municipality and when no nuisance is created.

[c] A discharge permit may be required by the department of natural resources.

[e] Allowed for exterior installation and when no sanitary sewer is in the building.

[f] Refer to the department of natural resources for discharge regulations.

[g] Fifty gallons per day.

[h] The department of natural resources may require WPDES permits for industrial discharges and may allow other options.

[i] Subsurface dispersal must comply with s. SPS 382.365.

[j] Discharge separate from the primary system and where observable.

History: CR 02−002: cr. Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. Table 82.38−1 line 15 Register January 2004 No. 577, eff. 2−1−04; CR 04−035: am. Table 82.38−1 Register November 2004 No. 587, eff. 12−1−04; CR 08−055: am. Table 82.38−1 Register February 2009 No. 638, eff. 3−1−09; correction in (3) (a), (b), Table 382.38−1 made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter IV — Water Supply Systems

SPS 382.40 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 811 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. SPS 384.

(3) GENERAL. (a) *Water quality.* 1. Every outlet providing water shall be provided with water of the quality as specified under s. SPS 382.70 (3) for the intended use.

2. Nonpotable water may be supplied to water treatment devices or systems designed to treat water for compliance with Table 382.70−1.

(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. Tempered water. a. Tempered water or hot water shall be provided to lavatories, wash fountains and shower heads which are not located in dwelling units or living units.

b. Tempered water supplied to serve multiple lavatories, wash fountains and shower heads shall be provided by means of temperature−actuated mixing valves that comply with ASSE 1017.

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 supersede the requirements of other state agencies for providing hot water.

(c) *Protection.* 1. Pursuant to s. NR 811.07 the interconnection of 2 or more water supply systems, one system served by a public supply source and the other system served by another supply source is prohibited, unless approved in writing by the department of natural resources.

2. A water supply system shall be designed and installed in accordance with s. SPS 382.41 and maintained to prevent nonpotable liquids, solids or gases from being introduced into the potable water supply system through cross connections.

3. a. Except as provided in subd. 3. b., when a connection between 2 water supply systems exists, one system having a higher degree of hazard than the other system as specified in s. SPS 382.41, the water supply system with a lower degree of hazard shall be protected as specified in s. SPS 382.41.

b. When a water treatment device is provided to lower the concentration of a health−related contaminant, cross connection control shall not be required to protect the water supply system downstream of the treatment device from the upstream contaminated source.

(d) *Identification.* 1. Where buildings or facilities contain water supply systems where the water supply systems have different degrees of hazard, then those water supply systems shall be labeled in accordance with this section.

a. Aboveground piping supplying water other than potable shall be labeled by tags or colored bands according to Table 382.40–1a.

Note: When identifying potable water piping or valves with tags or bands, label according to Table 382.40–1a.

b. Valves supplying other than potable water shall be identified by tags according to Table 382.40–1a.

c. The tags or colored bands shall be placed at intervals of not more than 25 feet. Where piping passes through a wall, floor or roof, the piping shall be so identified on each side of the wall and within each compartment.

d. The colored bands shall be at least 3 inches wide and shall bear text identifying the water or the specific use.

e. Tags used to identify water outlets, valves and piping shall be of metal or plastic in the shape specified in Table 382.40–1a.

f. The lettering on the triangular and circular tags shall be at least 1/2 inch in height.

g. A hose bibb intended to discharge water that does not meet drinking water quality as specified in s. SPS 382.70, shall be labeled as nonpotable or so identified for the specific use or uses, and shall be equipped with a removable handle.

2. Piping downstream of cross connection control assemblies as listed in Table 382.22–1 shall be labeled with bands or tags as specified in subd. 1. a. to f.

3. 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. The installation of each reduced pressure principle backflow preventer, reduced pressure fire protection principle backflow preventer, reduced pressure detector fire protection backflow preventer, spill resistant vacuum breaker and pressure vacuum breaker shall display a department assigned identification number.

a. The method to display the department assigned identification number shall be a weather−resistant tag, securely attached to the cross connection control assembly.

b. The tag shall contain at least the following information.

Wisconsin Department of Safety and Professional Services
Identification/Object Number _____
Cross Connection Control Assembly
Do Not Remove This Tag

c. The department assigned identification number shall be printed in the blank area with a permanent, waterproof marker or similar indelible method.

Note: To obtain a Department−assigned identification number for a cross connection control assembly, contact the Department's Division of Industry Services at P.O. Box 7162, Madison, WI 53707−7162; or at telephone (608) 266−2112 or (877) 617−1565 or 411 (Telecommunications Relay); or at fax (608) 267−9723; or at the Division's Web site at http://dsps.wi.gov/programs/industry−services.

(e) *Multipurpose piping system.* 1. Except as provided in subd. 2., a multipurpose piping system shall be designed and installed in accordance with this section and NFPA 13D.

Note: Pursuant to this subdivision and sub. (2), materials for multipurpose piping systems need to be acceptable under the NFPA 13D standard and s. SPS 384.30, Table 384.30–9.

Note: See s. SPS 321.095 of the Dwelling Code and s. SPS 362.0903 (10) of the Commercial Building Code as to fire protection provisions for multipurpose piping systems.

2. Fire department connections are prohibited in a multipurpose piping system.

(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" 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" 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 subd. 2. 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" 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.

Note: See ch. SPS 382 Appendix A−382.40 (4) for further explanatory material.

(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" 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" 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 subd. 2. 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" 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 ch. SPS 382 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. 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. 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. The control valve may be part of the bypass piping or an internal part of a water treatment device. When the valve is an internal part of the water treatment device, the device shall be removable for service.

c. 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. The water distribution system for buildings with more than 4 dwelling units or living units shall be provided 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 of 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. 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. 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. When the valve is an internal part of the water treatment device, the device shall be removable for service.

c. 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 peak demand.

(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 uncirculated 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. SPS 316.

5. The installation of self−regulating electric heating cable may be subcontracted by a plumber to another trade.

Note: See A−382.40 (5) for pipe insulation requirements.

(c) *Water heaters.* All water heaters and safety devices shall be designed and constructed in accordance with s. SPS 384.20 (5) (p).

Note: Water heaters are to be installed in accordance with the requirements specified in chs. SPS 361 to 366 and chs. SPS 320 to 325 with respect to energy efficiency, 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.

Note: The temperature steam rating of a combination temperature and pressure relief valve is commonly referred to as the AGA temperature steam rating.

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" 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. SPS 384.30 (4) (e) 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. SPS 382.33 (8). The outlet of the discharge pipe shall terminate within 6" 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 382.40−1b and 382.40−2 for the corresponding fixture and use. Water supply fixture units may be converted to gallons per minute in accordance with Table 382.40−3 or 382.40−3e.

(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 382.40−1a
Distribution and Service

Supply	Tag and Band Color	Tag Shape	Tag Size	Tag Legend[a]
Potable	Green	Round	3″ diam-eter	Safe Water
Nonpotable	Yellow	Triangle	4″ sides	Nonpotable Water or Not Safe for Drinking
Reuse (Nonpotable)	Purple	Triangle	4″ sides	Nonpotable Water or Not Safe for Drinking or Specific Use[b]
Device Specific[c]	Gray	Triangle	4″ sides	Specific Use[b]

[a] All nonpotable water outlets shall be identified at the point of use for each outlet with the following legends or as otherwise approved by the department.
[b] Tag should reflect the intended use.
[c] Serving an individual or similar plumbing fixtures or appliances.

Table 382.40−1b
Water Supply Fixture 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
Manufactured Home	−−	15	15
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

[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.
[b] FM means flushometer type.
[c] FT means flush tank type.

Table 382.40−2
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
Autopsy Table	2.0	2.0	3.0
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
Health Care Fixtures:			
Clinic sink	2.0	7.0	7.0
Exam/treatment sink	0.5	0.5	1.0
Sitz bath	1.5	1.5	2.0
Surgeon washup	1.5	1.5	2.0
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
Service sink	2.0	2.0	3.0
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		6.5	6.5
Gravity Type Flush Tank		3.0	3.0

[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.
[b] Load factors in gallons per minute, gpm, based on manufacturer's requirements.

Table 382.40−3
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.

Table 382.40–3e
Conversion of Water Supply Fixture Units to Gallons Per Minute for Water Treatment Devices[a] Serving an Individual Dwelling[b]

Water Supply Fixture Units (WSFUs)	Gallons Per Minute (GPM)
1	1
2	2
3	3
4	4
5	4.5
6	5
7	6
8	6.5
25	7
35	8
40	9

[a] Treatment devices providing treatment for compliance with Table 382.70–1 shall use Table 382.40–3 for conversion.

[b] Table shall not be used for converting hose bibb, high flow fixture or hydrant wsfu.

(7) SIZING OF WATER SUPPLY PIPING. The sizing of the water supply system shall be based on the empirical method and limitations outlined 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 ch. SPS 382 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" in diameter.

Note: See ch. SPS 382 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 382.40−4 to 382.40−9.

(d) *Pressure.* 1. Except as provided in subd. 1. 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 siphonic type urinals, washdown type urinals and washdown type water closets, siphonic type flushometer water closets and campsite water supply hose connections 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, manufactured homes, and thermostatic mixing valves shall be at least 20 psig.

c. The flow pressure at the outlets of the fixture supplies serving blowout 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 subd. 2. 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" 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" 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" in diameter.

1. Fixture supplies serving syphon jet type urinals shall be at least 3/4" 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 of fixture supply connectors.* 1. a. Except as provided in subd. 1. b. and c., fixture supply connectors may not exceed more than 24" in developed length upstream from a plumbing fixture or the body of a faucet.

b. A fixture supply connector located downstream of a water cooler, water treatment device or water heater which individually serves a faucet or outlet may not exceed more than 10 feet in developed length.

c. A fixture supply connector located upstream of a water treatment device serving no more than 2 fixtures or outlets may not exceed 10 feet in developed length.

2. Fixture supply connectors may not extend more than 10 feet in developed length upstream of a plumbing appliance.

(8) INSTALLATION. (a) *Frost protection.* 1. 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. SPS 382.30 (11) (c) 2. d., Figure 382.30−1 and Table 382.30−6, unless other protective measures from freezing are taken.

2. A hose bibb or a hydrant that penetrates an exterior wall of a heated structure shall be a frost proof and self−draining type.

Note: See s. SPS 382.41 (4) (m) relative to cross connection control devices.

(b) *Location.* 1. Exterior water supply piping may not be located in, under or above sanitary sewer manholes, or POWTS treatment, holding or dispersal components.

2. If a private water main or a water service crosses a sanitary sewer, the water piping within 5 feet of the point of crossing shall be installed in accordance with any of the following requirements:

a. The water piping shall be installed at least 12 inches above the top of the sewer.

b. The water piping shall be installed at least 18 inches below the bottom of the sewer.

c. The water or sewer piping shall be installed within a waterproof sleeve made of materials as specified for sanitary building sewers in s. SPS 384.30 (2).

3. Except as permitted in subds. 4 and 5., private water mains and water services shall be installed at least 5 feet horizontally from any sanitary sewer.

Note: The Department of Natural Resources has limitations for the separation of water mains and sanitary sewers.

4. Private water mains and water services may be installed less than 5 feet horizontally from a pressurized sanitary sewer if all of the following conditions are met:

a. The bottom of the water piping is installed at least 18 inches above the pressurized sewer.

b. The water piping is installed at least 3 feet horizontally from the pressurized sewer.

5. Private water mains and water services may be installed less than 5 feet horizontally from a non−pressurized sanitary sewer if any of the following conditions are met:

a. The bottom of the water piping is installed at least 12 inches above the sewer.

b. The sewer is constructed of materials listed in Table 384.30−2.

c. The water service is 2 inches or less in diameter and is located more than 24 inches from the sewer.

6. The portion of a private water main or 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 and within 24 inches of the sewer.

7. No private water main or water service may be installed within 6 inches of a storm sewer.

Note: See ch. SPS 382 Appendix A−382.30 (11) (d) for setback distance from yard hydrant to well.

Note: See ch. SPS 383 Table 383.43–1 for setback distances to POWTS components.

9. No underground water supply storage tank shall be installed within 8 feet of a storage vessel containing a substance of a higher hazard than that contained in the water supply storage tank.

(c) *Limitations.* No private water main or water service may pass through or under a building to serve another building unless one of the following conditions are met:

1. The private water main or water service serves farm buildings or farm houses, or both that are all located on one property.

2. The private water main or water service serves buildings that are located on the same property and a document which indicates that the piping and distribution arrangement for the property and buildings will be recorded with the register of deeds no later than 90 days after installation.

(d) *Water distribution piping.* 1. Water distribution piping shall be supported in accordance with s. SPS 382.60.

2. Provisions shall be made to evacuate all water out of the water distribution system.

3. a. Except where parallel water meters are installed, water distribution piping shall be provided to bypass a water meter 1½″ or larger.

b. The minimum diameter of water distribution piping serving as a meter bypass shall be one nominal pipe size smaller than the meter.

4. Except as provided in subds. 5. and 6., a bypass shall be provided to serve a water treatment device. The bypass piping may be an internal part of the water treatment device.

5. A bypass shall not be required when a water treatment device serves no more than 2 fixtures or outlets.

6. A bypass shall be prohibited for a water treatment device installed to reduce a contaminant in order to comply with the provisions in s. SPS 382.70 (3).

(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 except in the following situations:

a. Fire hydrants intended for fire fighting.

b. Two−inch and larger diameter hydrants serving municipal wastewater treatment plants.

c. Emergency fixtures.

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” 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 or combination thermostatic−pressure balanced mixing valves or by individually controlled pressure balanced mixing valves. A thermostatic or combination thermostatic−pressure balanced mixing valve may not be bypassed.

(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 C651 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. SPS 384.30 (1) regarding the bending of pipe and protection from puncture.

4. New or repaired combination water services or combination private water mains shall be flushed and disinfected prior to use in accordance with NFPA 24.

(j) *Water softeners.* Ion exchange water softeners used primarily for water hardness reduction that, during regeneration, discharge a brine solution shall be of a demand initiated regeneration type equipped with a water meter or a sensor unless a wastewater treatment system downstream of the water softener specifically documents the reduction of chlorides.

(k) *Locating requirements.* 1. A means to locate buried non−metallic water services and private water mains connected to municipal supply systems shall be provided in accordance with the options under s. SPS 382.30 (11) (h), except as provided in subds. 2. and 3.

2. Tracer wire insulation color for non−metallic, potable water pipe shall be blue.

3. Tracer wire insulation color for non−metallic, non−potable water pipe shall be purple.

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; renum. from H 62.13, Register, July, 1983, No. 331, eff. 8−1−83; renum. 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. Register, May, 1988, No. 389, eff. 6−1−88; am. (5) (d) 5. a., r. and recr. (7) (h) 1. and (8) (c), renum. (8) (c) 2. to 6. to be (8) (b) 4. to 8. and am. (8) (b) 4. c., Register, August, 1991, No. 428, eff. 9−1−91; am. (8) (b) 1. and 2., Register, April, 1992, No. 436, eff. 5−1−92; renum. (3) (c) and (8) (a) to be (3) (c) 2. and (8) (a) 1. and am. (8) (a) 1., cr. (3) (c) 1., (e), (8) (a) 2. and Table 82.40−9, am. (7) (c), r. (3) (b) 1. b. and c., Register, February, 1994, No. 458, eff. 3−1−94; r. (5) (b) 3., renum. (5) (b) 4., 5. to be (5) (b) 3., 4., Register, December, 1996, No. 480, eff. 4−1−96; correction in (5) (b) 3., made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; r. and recr. (5) (b), Register, February, 1997, No. 494, eff. 4−1−97; reprinted to restore dropped copy, Register, April, 1997, No. 496; am. (3) (e) and (8) (b) 1. and 2., r. (8) (b) 3. and cr. (3) (f) and (8) (j), Register, April, 2000, No. 532, eff. 7−1−00; except (3) (f) eff. 5−1−00; cr. (3) (d) 3., am. (8) (g) and (i) 2., Register, December, 2000, No. 540, eff. 1−1−01; except (3) (d) 3., eff. 9−1−01; CR 02−002: r. and recr. (3) (a), (d) 1. (intro.) to b., (7) (h), (8) (c) and Tables 82.40−4 to 11, cr. (3) (a) 2., (c) 3. and (d) 1. h., am. (3) (b) 1., (4) (c) 1. b. and 2. b., (7) (d) 1. a. and b., (8) (d) 4., (g), and Tables 82.40−1 and 2, r. (3) (e), renum. (3) (f) and (8) (b) 4. to 8. to be (3) (e) and (8) (b) 3. to 7., Register April 2003 No. 568, eff. 5−1−03; CR 02−129: am. (4) (c) 1. b. Register January 2004 No. 577, eff. 2−1−04, correction in (8) (b) 5. made under s. 13.93 (2m) b. 7., Stats., Register January 2004 No. 577; CR 04−035: r. (3) (e) 2. c., r. and recr. Table 82.40−9, cr. (8) (i) 4. Register November 2004 No. 587, eff. 12−1−04; CR 06−120: r. and recr. (3) (e) 2. b., cr. (3) (e) 2. c. Register February 2008 No. 626, eff. 3−1−08; CR 07−069: cr. (8) (k) Register February 2008 No. 626, eff. 3−1−08; CR 07−100: am. (8) (b) 2. Register September 2008 No. 633, eff. 10−1−08; CR 08−055: am. (3) (b) 1. b., (d) 3. (intro.), (5) (c), (6) (a), (7) (d) 1. b., (8) (b) 2., (j), Tables 82.40−1 and 82.40−2, r. and recr. (3) (e), (8) (e) 2., cr. (8) (b) 8., (d) 3. b. and Table 82.40−3e, renum. (8) (d) 3. to be (8) (d) 3. a. Register February 2009 No. 638, eff. 3−1−09; CR 10−064: am. (3) (a) (title), (c) 1., (5) (a), (6) (a), (8) (b) 3. to 6.,Table 82.40−8 (title) and Table 82.40−10 (title), r. and recr. (3) (d) 1., renum. (3) (d) 2., 3. and Table 82.40−1 to be (3) (d) 3., 4. and Table 82.40−1b, cr. (3) (d) 2., (8) (b) 9., Table 82.40−1a, r. (9) Register December 2010 No. 660, eff. 1−1−11; CR 10−103: r. (3) (e) 2. b. to 2. d., renum. (3) (e) 2. a. to (3) (e) 2., Register August 2011 No. 668, eff. 9−1−11; correction in (2), (3) (a) 1., 2., (c) 2., 3. a., (d) 1. a., b., e., g., 2., 4. b., (5) (b) 4., (c), (d) 5. a., e., (6) (a), (7) (c), (8) (a) 1., (b) 3. c., 5. b., (d) 1., 6., (k) 1., Table 382.40−3e made under s. 13.92 (4) (b) 6., 7., Stats., Register December 2011 No. 672; CR 11−031: r. (8) (b) 2., 8., renum. (8) (b) 3., 4. to (8) (b) 2., 3., am. (8) (b) 3., cr. (8) (b) 4., am. (8) (b) 5. (intro.), 7. Register June 2013 No. 690, eff. 7−1−13; **CR 13−046: am. (6) (a) Register December 2013 No. 696, eff. 1−1−14.**

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Table 382.40−4

MAXIMUM ALLOWABLE LOAD FOR COPPER TUBING−TYPE K, ASTM B88; (C=150)

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	0.5	−	0.5	1.5	−	1.5	3.5	−	3.5	6.5	−	8.0	10.5	4.0	14.0	22.0	7.0	35.0	39.0	28.0	83.0	62.0	80.0	185	132	437	538
1	1.0	−	1.0	2.5	−	2.5	5.0	−	6.0	9.5	−	12.5	15.5	5.0	22.5	32.0	16.0	60.0	57.0	67.0	160	91.0	196	330	192	864	882
2	1.0	−	1.0	3.5	−	3.5	7.5	−	9.5	14.0	4.5	20.0	22.0	7.0	35.0	47.0	42.0	116	83.0	160	290	132	437	538	279	1611	1611
3	1.5	−	1.5	4.5	−	5.0	9.5	−	12.5	17.5	5.5	25.5	28.0	11.0	50.0	58.0	70.0	165	103	261	390	165	661	723	291	1725	1725
4	2.0	−	2.0	5.0	−	6.0	11.5	4.0	15.5	20.5	6.5	31.0	32.0	16.0	60.0	68.0	100	215	116	338	455	165	665	726	NP		
5	2.0	−	2.0	6.0	−	7.0	13.0	4.5	18.0	23.0	7.5	37.0	36.0	22.0	73.0	75.0	128	250	NP			NP					
6	2.5	−	2.5	6.5	−	8.0	14.0	4.5	20.0	25.0	8.5	42.0	40.0	30.0	86.0	NP											
7	2.5	−	2.5	7.0	−	9.0	15.5	5.0	22.5	28.0	11.0	50.0	42.0	34.0	103												
8	3.0	−	3.0	7.5	−	9.5	16.5	5.5	24.0	30.0	13.5	55.0	NP														
9	3.0	−	3.0	8.0	−	10.0	17.5	5.5	25.5	NP																	
10	3.5	−	3.5	8.5	−	10.5	18.5	6.0	27.5																		
11	3.5	−	3.5	9.0	−	11.5	19.0	6.0	28.5																		
12	3.5	−	3.5	9.5	−	12.5	NP																				
13	4.0	−	4.0	10.0	4.0	13.0																					
14	4.0	−	4.0	10.5	4.0	14.0																					
15	4.0	−	4.0	10.5	4.0	14.5																					
16	4.5	−	5.0	NP																							
17	4.5	−	5.0																								
18	4.5	−	5.0																								
19	5.0	−	6.0																								
	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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

Table 382.40−5
MAXIMUM ALLOWABLE LOAD FOR COPPER TUBING−TYPE L, ASTM B88; (C=150)

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	0.5	−	0.5	2.0	−	2.0	4.0	−	4.0	7.0	−	9.0	11.0	4.0	15.0	23.0	7.5	37.0	40.0	30.0	86.0	65.0	90.0	200	136	462	561
1	1.0	−	1.0	2.5	−	2.5	5.5	−	6.5	10.0	4.0	13.0	16.0	5.0	23.0	33.0	17.5	63.0	59.0	72.0	170	94.0	211	345	198	909	923
2	1.5	−	1.5	4.0	−	4.0	8.5	−	10.5	14.5	4.5	20.5	23.0	7.5	37.0	48.0	44.0	120	86.0	175	305	137	468	566	288	1694	1694
3	2.0	−	2.0	5.0	−	6.0	10.5	4.0	14.0	18.5	6.0	27.5	29.0	12.5	52.0	60.0	75.0	175	107	283	410	169	698	752	298	1792	1792
4	2.0	−	2.0	6.0	−	7.0	12.0	4.0	16.5	21.5	7.0	33.0	34.0	18.5	66.0	70.0	108	225	119	356	469	NP			NP		
5	2.5	−	2.5	6.5	−	8.0	14.0	4.5	20.0	24.0	8.0	40.0	38.0	26.0	80.0	77.0	136	260	NP								
6	2.5	−	2.5	7.5	−	9.5	15.5	5.0	22.5	26.0	9.0	45.0	42.0	33.0	100	NP											
7	3.0	−	3.0	8.0	−	10.0	16.5	5.5	24.0	29.0	12.5	52.0	44.0	37.0	107												
8	3.0	−	3.0	8.5	−	10.5	18.0	6.0	26.5	31.0	15.0	58.0	NP														
9	3.5	−	3.5	9.5	−	12.5	19.0	6.0	28.0	NP																	
10	3.5	−	3.5	10.0	4.0	13.0	20.0	6.5	30.0																		
11	4.0	−	4.0	10.5	4.0	14.0	20.5	6.5	31.0																		
12	4.0	−	4.0	11.0	4.0	15.0	NP																				
13	4.0	−	4.0	11.5	4.0	15.5																					
14	4.5	−	5.0	12.0	4.0	16.5																					
15	4.5	−	5.0	NP																							
16	5.0	−	6.0																								
17	5.0	−	6.0																								
18	5.0	−	6.0																								
19	5.0	−	6.0																								
20	5.5	−	6.5																								
	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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

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Table 382.40−6
MAXIMUM ALLOWABLE LOAD FOR COPPER TUBING−TYPE M, ASTM B88; (C=150)

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	0.5	−	0.5	2.0	−	2.0	4.0	−	4.0	7.0	−	9.0	11.5	4.0	15.5	23.0	7.5	37.0	42.0	33.0	100	67.0	96.0	210	139	481	577
1	1.0	−	1.0	3.0	−	3.0	6.0	−	7.0	10.5	4.0	14.0	16.5	5.5	24.0	34.0	18.5	66.0	61.0	77.0	180	97.0	227	360	202	945	953
2	1.5	−	1.5	4.5	−	5.0	9.0	−	11.5	15.5	5.0	22.5	24.0	8.0	40.0	50.0	48.0	128	88.0	184	315	141	493	588	294	1750	1750
3	2.0	−	2.0	5.5	−	6.5	11.5	4.0	15.5	19.5	6.5	29.0	30.0	13.5	55.0	62.0	80.0	185	110	300	425	174	731	776	303	1835	1835
4	2.5	−	2.5	6.5	−	8.0	13.0	4.5	18.0	22.0	7.0	35.0	35.0	20.0	70.0	73.0	120	240	121	374	484	NP			NP		
5	2.5	−	2.5	7.5	−	9.5	15.0	5.0	21.5	25.0	8.5	42.0	40.0	30.0	86.0	79.0	144	270	NP								
6	3.0	−	3.0	8.0	−	10.0	16.5	5.5	24.0	28.0	11.0	50.0	44.0	36.0	106	NP											
7	3.5	−	3.5	9.0	−	11.5	18.0	6.0	26.5	30.0	13.5	55.0	45.0	39.0	112												
8	3.5	−	3.5	9.5	−	12.5	19.5	6.5	29.0	32.0	17.0	62.0	NP														
9	4.0	−	4.0	10.0	4.0	13.0	20.5	6.5	31.0	NP																	
10	4.0	−	4.0	11.0	4.0	15.0	21.5	7.0	34.0																		
11	4.5	−	5.0	11.5	4.0	15.5	NP																				
12	4.5	−	5.0	12.0	4.0	16.5																					
13	5.0	−	6.0	12.5	4.5	17.5																					
14	5.0	−	6.0	12.5	4.5	18.0																					
15	5.0	−	6.0	NP																							
16	5.5	−	6.5																								
17	5.5	−	6.5																								
18	5.5	−	6.5																								
19	6.0	−	7.0																								
20	6.0	−	7.0																								
21	6.0	−	7.5																								
	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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

Table 382.40−7

MAXIMUM ALLOWABLE LOAD FOR GALVANIZED STEEL PIPE, SCHEDULE 40, ASTM A53; (C=150)

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	0.5	−	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	18.5	66.0	60.0	75.0	175	123	381	490
1	1.0	−	1.0	2.5	−	2.5	5.0	−	6.0	10.5	4.0	14.0	16.0	5.0	23.0	31.0	15.0	57.0	49.0	46.0	124	87.0	180	310	179	769	805
2	1.5	−	1.5	4.0	−	4.0	7.5	−	9.5	15.5	5.0	22.5	23.0	7.5	37.0	45.0	38.0	110	72.0	116	235	127	406	511	260	1435	1435
3	2.0	−	2.0	5.0	−	6.0	9.0	−	11.5	19.0	6.0	28.0	29.0	12.5	52.0	56.0	65.0	155	89.0	188	320	158	607	683	317	1966	1966
4	2.5	−	2.5	5.5	−	6.5	11.0	4.0	15.0	22.0	7.0	35.0	34.0	18.5	66.0	65.0	90	200	104	266	395	184	809	837	NP		
5	3.0	−	3.0	6.5	−	8.0	12.0	4.0	16.5	25.0	8.5	42.0	38.0	26.0	80.0	74.0	124	245	118	350	465	NP					
6	3.0	−	3.0	7.0	−	9.0	13.5	4.5	19.0	28.0	11.0	50.0	42.0	33.0	100	81.0	152	280	119	358	471						
7	3.5	−	3.5	7.5	−	9.5	14.5	4.5	20.5	30.0	13.5	55.0	46.0	40.0	113	83.0	163	293	NP								
8	4.0	−	4.0	8.0	−	10.0	16.0	5.0	23.0	33.0	17.5	63.0	49.0	46.0	124	NP											
9	4.0	−	4.0	9.0	−	11.5	17.0	5.5	25.0	35.0	20.0	70.0	50.0	49.0	131												
10	4.5	−	5.0	9.5	−	12.5	18.0	6.0	26.5	37.0	24.0	76.0	NP														
11	4.5	−	5.0	10.0	4.0	13.0	19.0	6.0	28.0	37.0	24.0	77.0															
12	5.0	−	6.0	10.5	4.0	14.0	19.5	6.5	29.0	NP																	
13	5.0	−	6.0	11.0	4.0	15.0	20.5	6.5	31.0																		
14	5.0	−	6.0	11.0	4.0	15.0	21.5	7.0	33.0																		
15	5.5	−	6.5	11.5	4.0	15.5	NP																				
16	5.5	−	6.5	12.0	4.0	16.5																					
17	6.0	−	7.0	12.5	4.5	17.5																					
18	6.0	−	7.0	13.0	4.5	18.0																					
19	6.0	−	7.0	13.0	4.5	18.5																					
20	6.5	−	8.0	NP																							
21	6.5	−	8.0																								
22	7.0	−	9.0																								
23	7.0	−	9.0																								
24	7.0	−	9.0																								
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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

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Table 382.40−8
CHLORINATED POLYVINYL CHLORIDE TUBING, ASTM D2846 and F442, SDR 11; (C=150)

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”		
		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	1.5	−	1.5	3.0	−	3.0	5.0	−	6.0	8.0	−	10.0	16.0	5.0	23.0
1	0.5	−	0.5	2.0	−	2.0	4.0	−	4.0	7.5	−	9.5	11.5	4.0	15.5	23.0	7.5	37.0
2	1.0	−	1.0	3.0	−	3.0	6.0	−	7.0	10.5	4.0	14.0	16.5	5.5	24.0	34.0	18.5	66.0
3	1.5	−	1.5	4.0	−	4.0	8.0	−	10.0	13.5	4.5	19.0	21.0	7.0	32.0	42.0	33.0	100
4	1.5	−	1.5	4.5	−	5.0	9.0	−	11.5	15.5	5.0	22.5	24.0	8.0	40.0	50.0	48.0	128
5	2.0	−	2.0	5.0	−	6.0	10.5	4.0	14.0	17.5	5.5	25.5	27.0	10.0	47.0	56.0	65.0	155
6	2.0	−	2.0	6.0	−	7.0	11.5	4.0	15.5	19.5	6.5	29.0	30.0	13.5	55.0	59.0	73.0	171
7	2.0	−	2.0	6.5	−	8.0	12.5	4.5	17.5	21.5	7.0	33.0	33.0	17.5	63.0	NP		
8	2.5	−	2.5	7.0	−	9.0	13.5	4.5	19.0	23.0	7.5	37.0	34.0	19.0	68.0			
9	2.5	−	2.5	7.0	−	9.0	14.5	4.5	20.5	24.0	8.0	40.0	NP					
10	2.5	−	2.5	7.5	−	9.5	15.0	5.0	21.5	24.0	8.0	41.0						
11	3.0	−	3.0	8.0	−	10.0	16.0	5.0	23.0	NP								
12	3.0	−	3.0	8.5	−	10.5	16.5	5.5	24.0									
13	3.0	−	3.0	9.0	−	11.5	NP											
14	3.0	−	3.0	9.5	−	12.5												
15	3.5	−	3.5	9.5	−	12.5												
16	3.5	−	3.5	10.0	4.0	13.0												
17	3.5	−	3.5	NP														
18	4.0	−	4.0															
19	4.0	−	4.0															
20	4.0	−	4.0															
21	4.0	−	4.0															
22	4.0	−	4.0															
23	4.5	−	5.0															
	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 wash down 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.

SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

Table 382.40−9
MAXIMUM ALLOWABLE LOAD FOR CROSSLINKED POLYETHYLENE (PEX) TUBING, ASTM F876 and F877; (C=150)

Pressure Loss Due to Friction (in lbs. per 100 ft. of Length)	Pipe Diameter (in inches)																				
	1/2”			5/8”			3/4”			1”			1 1/4”			1 1/2”			2”		
		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
0.5	0.5	−	0.5	0.5	−	0.5	1.0	−	1.0	2.5	−	2.5	4.0	−	4.0	6.5	−	8.0	13.5	4.5	19.0
1	0.5	−	0.5	1.0	−	1.0	1.5	−	1.5	3.5	−	3.5	6.0	−	7.0	9.5	−	12.5	19.5	6.5	29.0
2	1.0	−	1.0	1.5	−	1.5	2.5	−	2.5	5.0	−	6.0	9.0	−	11.5	14.0	4.5	20.0	28.0	11.0	50.0
3	1.0	−	1.0	2.0	−	2.0	3.0	−	3.0	6.5	−	8.0	11.0	4.0	15.0	17.5	5.5	25.5	36.0	22.0	73.0
4	1.5	−	1.5	2.5	−	2.5	4.0	−	4.0	7.5	−	9.5	13.0	4.5	18.0	20.5	6.5	31.0	42.0	33.0	100
5	1.5	−	1.5	3.0	−	3.0	4.5	−	5.0	8.5	−	10.5	15.0	5.0	21.5	23.0	7.5	37.0	47.0	42.0	116
6	2.0	−	2.0	3.0	−	3.0	5.0	−	6.0	9.5	−	12.5	16.5	5.5	24.0	25.0	8.5	42.0	51.0	53.0	135
7	2.0	−	2.0	3.5	−	3.5	5.5	−	6.5	10.5	4.0	14.0	18.0	6.0	26.5	28.0	11.0	50.0	NP		
8	2.0	−	2.0	3.5	−	3.5	5.5	−	6.5	11.0	4.0	15.0	19.0	6.0	28.0	30.0	13.5	55.0			
9	2.5	−	2.5	4.0	−	4.0	6.0	−	7.0	12.0	4.0	16.5	20.5	6.5	31.0	NP					
10	2.5	−	2.5	4.0	−	4.0	6.5	−	8.0	12.5	4.5	17.5	21.5	7.0	34.0						
11	2.5	−	2.5	4.5	−	5.0	7.0	−	9.0	13.5	4.5	19.0	NP								
12	2.5	−	2.5	4.5	−	5.0	7.0	−	9.0	14.0	4.5	20.0									
13	3.0	−	3.0	5.0	−	6.0	7.5	−	9.5	14.5	4.5	20.5									
14	3.0	−	3.0	5.0	−	6.0	8.0	−	10.0	NP											
15	3.0	−	3.0	5.5	−	6.5	8.0	−	10.0												
16	3.0	−	3.0	5.5	−	6.5	8.5	−	10.5												
17	3.5	−	3.5	5.5	−	6.5	8.5	−	11.0												
18	3.5	−	3.5	6.0	−	7.0	NP														
19	3.5	−	3.5	6.0	−	7.0															
20	3.5	−	3.5	6.0	−	7.5															
21	4.0	−	4.0	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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

Table 382.40−10

MAXIMUM ALLOWABLE LOAD FOR CHLORINATED POLYVINYL CHLORIDE TUBING, ASTM F442, SDR 13.5; (C=150)

Pressure Loss Due to Friction (in lbs. per 100 ft. of Length)	Pipe Diameter (in inches)																				
	3/4”			1”			1 1/4”			1 1/2”			2”			2 1/2”			3”		
		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
0.5	2.5	−	2.5	4.5	−	5.0	9.0	−	11.5	13.0	4.5	18.0	23.0	7.5	37.0	38.0	26.0	80.0	65.0	90.0	200
1	3.5	−	3.5	7.0	−	9.0	13.0	4.5	18.0	18.5	6.0	27.5	34.0	18.5	66.0	56.0	65.0	155	94.0	211	345
2	5.5	−	6.5	10.0	4.0	13.0	19.0	6.0	28.0	27.0	10.0	47.0	49.0	46.0	124	82.0	156	285	138	475	572
3	7.0	−	9.0	12.5	4.5	17.5	23.0	7.5	37.0	34.0	18.5	66.0	62.0	80.0	185	102	255	385	170	703	755
4	8.0	−	10.0	15.0	5.0	21.5	27.0	10.0	47.0	40.0	30.0	86.0	72.0	116	235	114	331	449	NP		
5	9.0	−	11.5	16.5	5.5	24.0	31.0	15.0	57.0	45.0	38.0	110	78.0	142	267	NP					
6	10.0	4.0	13.0	18.5	6.0	27.5	34.0	18.5	66.0	49.0	46.0	124	NP								
7	11.0	4.0	15.0	20.0	6.5	30.0	37.0	24.0	76.0	50.0	48.0	128									
8	11.5	4.0	15.5	21.5	7.0	33.0	38.0	26.0	80.0	NP											
9	12.5	4.5	17.5	23.0	7.5	37.0	NP														
10	13.0	4.5	18.0	23.0	7.5	39.0															
11	14.0	4.5	20.0	NP																	
12	14.5	4.5	20.5																		
13	14.5	5.0	21.5																		
	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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.
Approved for cold water use only.
Intended use is for MPP systems.

Table 382.40−11

MAXIMUM ALLOWABLE LOAD FOR POLYETHYLENE ALUMINUM POLYETHYLENE TUBING (PexAlPex), ASTM F1281; (C=150)

Pressure Loss Due to Friction (in lbs. per 100 ft. of Length)	Pipe Diameter (in inches)											
	1/2”			5/8”			3/4”			1”		
		WSFU			WSFU			WSFU			WSFU	
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	0.5	–	0.5	1.0	–	1.0	2.0	–	2.0	4.0	–	4.0
1	0.5	–	0.5	1.5	–	1.5	3.0	–	3.0	6.0	–	7.0
2	1.0	–	1.0	2.0	–	2.0	4.5	–	5.0	8.5	–	10.5
3	1.5	–	1.5	3.0	–	3.0	5.5	–	6.5	10.5	4.0	14.0
4	1.5	–	1.5	3.5	–	3.5	6.5	–	8.0	12.5	4.5	17.5
5	2.0	–	2.0	4.0	–	4.0	7.0	–	9.0	14.0	4.5	20.0
6	2.0	–	2.0	4.0	–	4.0	8.0	–	10.0	15.5	5.0	22.5
7	2.5	–	2.5	4.5	–	5.0	8.5	–	10.5	17.0	5.5	25.0
8	2.5	–	2.5	5.0	–	6.0	9.5	–	12.5	18.0	6.0	26.5
9	2.5	–	2.5	5.5	–	6.5	10.0	4.0	13.0	19.5	6.5	29.0
10	3.0	–	3.0	5.5	–	6.5	10.5	4.0	14.0	20.5	6.5	31.0
11	3.0	–	3.0	6.0	–	7.0	11.0	4.0	15.0	20.5	6.5	32.0
12	3.0	–	3.0	6.0	–	7.0	11.5	4.0	15.5	NP		
13	3.5	–	3.5	6.5	–	8.0	12.5	4.5	17.5			
14	3.5	–	3.5	7.0	–	9.0	NP					
15	3.5	–	3.5	7.0	–	9.0						
16	3.5	–	3.5	7.5	–	9.5						
17	4.0	–	4.0	NP								
18	4.0	–	4.0									
19	4.0	–	4.0									
20	4.0	–	4.0									
21	4.5	–	5.0									
	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 wash down 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.
SPS 382.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

SPS 382.41 Cross connection control. (1) SCOPE. The provisions of this section set forth the requirements for the protection of water within water supply systems when and where there is the possibility of contamination due to cross connections or backflow conditions.

Note: The Department of Natural Resources governs the operation and design of community water systems and under s. NR 811.09 requires the supplier of water to develop and implement a comprehensive cross connection control program.

(2) MATERIALS. (a) All devices, assemblies and mechanisms intended to protect water supplies relative to cross connection or backflow shall be of a type recognized and approved in accordance with ch. SPS 384 and as described in sub. (4).

(b) All methods including barometric loops and air gaps intended to protect water supplies relative to cross connection or backflow shall be constructed of materials suitable for water supply systems in accordance with ch. SPS 384.

(3) GENERAL REQUIREMENTS. Water supply systems and the connection of each plumbing fixture, piece of equipment, appliance or nonpotable water piping system shall be designed, installed and maintained in such a manner to prevent the contamination of water supplies by means of cross connections.

(a) *Types of cross connection control.* 1. Water supply systems shall be protected against contamination due to cross connections or backflow conditions by one of the methods or devices specified in Table 382.41−1 depending upon the situation or Table 382.41−2 depending upon the specific application or use, and the limitations specified in sub. (4).

2. For the situations described in par. (b) 3., cross connection control shall be provided as part of the fixture fitting outlet or in the water supply piping for the fixture fitting outlet.

(b) *Classifications.* For the purposes of this section:

1. The designation of a high hazard or low hazard situation shall be determined on the basis of how a toxic or nontoxic solution is intended or recommended by the manufacturer of the solution to interface with the potable water supply system.

2. a. A continuous pressure situation shall be considered to exist when a pressure greater than atmospheric within the water supply system exists for more than 12 continuous hours.

b. A noncontinuous pressure situation shall be considered to exist if the conditions in subd. 2. a. do not occur.

3. A high hazard cross connection situation shall be considered to exist for a connection of the water supply system to:

a. Any part of the drain system; and

b. Any other piping system conveying water from nonpotable sources, including but not limited to lakes, rivers, streams or creeks.

4. Except as provided in subd. 5., a high hazard cross connection situation shall be considered to exist at:

a. A water supply hose bibb, faucet, wall hydrant, sill cock or other outlet which terminates with hose threads allowing a hose to be attached;

b. A water supply faucet, wall hydrant or other outlet which terminates with a serrated nipple allowing a hose to be attached;

c. A water supply faucet, hydrant or outlet serving a sink used for building maintenance in a public building;

d. A chemical pot−feeder or automatic chemical feeder is installed to serve a boiler, cooling tower or chilled water system; and

e. In the water supply piping connecting to the outlet of a fire hydrant for any purpose other than fire suppression.

5. A cross connection shall not be considered to exist at the hose threaded outlet installed for the sole purpose of:

a. Draining a water supply system or any portion thereof;

b. Obtaining water quality samples of the water supply system or any portion thereof; or

c. Connecting individual residential automatic clothes washers.

6. a. A high hazard situation shall be considered to exist for the connection of 2 water supply systems one supplied by a public water supply and the other system supplied by a private well.

Note: The interconnection of a public water supply system and another source of water is addressed in s. NR 811.09 and must be approved by the Department of Natural Resources.

b. Except as provided in subd. 7., a low hazard situation shall be considered to exist for the connection of a piping system, including but not limited to automatic fire sprinkler systems, standpipe systems, and processing purposes, which provides potable water for nonrequired potable water uses.

Note: Cross connection control devices used in conjunction with automatic fire sprinkler systems are to be listed by an acceptable testing agency for such an application under the standards governing the design and installation of automatic fire sprinkler systems.

7. A cross connection situation shall not be considered to exist when a multipurpose piping system serves a one− or 2− family dwelling provided the sprinkler system is constructed of materials and joints suitable for water distribution systems as specified in ss. SPS 384.30 (4) (e) and 384.40, respectively.

(c) *Containment.* 1. For sewerage treatment facilities which are required to conform with ch. NR 110, in addition to the cross connection control required for each potable water usage or water outlet, a reduced pressure principle backflow preventer shall be installed:

a. In the water service to each building or structure within the complex;

b. In the private water main upstream of all water services serving the facility; or

c. In the water distribution system upstream of all water outlets and in the process piping network upstream of all points of use, if both a water distribution system and a process network is contained within the same building or structure.

2. For marinas, wharves and docks where potable water outlets are provided to serve boats or ships, in addition to the cross connection control required for each potable water outlet or usage, a reduced pressure principle backflow preventer shall be installed in the water supply system to limit backflow into the water supply source.

3. The installation of a cross connection control device in the water supply system for a building or structure shall not alleviate the requirement to provide cross connection control for the connection of each plumbing fixture, piece of equipment, appliance or other piping system.

(d) *Prohibitions.* The use of a toxic solution as a heat transfer fluid in single−wall heat exchanger for potable water is prohibited.

(e) *Existing automatic fire sprinkler systems.* An alteration, modification or addition to an existing automatic fire sprinkler shall necessitate conformance with this section, if the:

1. Existing water supply line to the existing sprinkler system is increased in diameter; or

2. Existing device or method which had been previously recognized to address cross connection concerns is to be removed or replaced.

Table 382.41−1

Acceptable Cross Connection Control Methods, Devices or Assemblies

Methods or Assemblies of Cross Connection Control (Standard)	Situations and Conditions							
	Backpressure				Backsiphonage			
	Low Hazard		High Hazard		Low Hazard		High Hazard	
	Continuous Pressure	Noncontinuous Pressure	Continuous Pressure	Noncontinuous Pressure	Continuous Pressure	Noncontinuous Pressure	Continuous Pressure	Noncontinuous Pressure
Air−gap Fittings for use with Plumbing Fixtures, Appliances, and Appurtenances (ASME A112.1.3)					X	X	X	X
Air Gaps (ASME A112.1.2)	X	X	X	X	X	X	X	X
Atmospheric Vacuum Breaker (CAN/CSA B64.1.1)						X		X
Backflow Preventers with Intermediate Atmospheric Vent (ASSE 1012)	X	X			X	X		
Barometric Loops					X	X	X	X
Dual Check Valve Type with Atmospheric Port Backflow Preventer (CAN/CSA B64.3)	X	X			X	X		
Hose Connection Backflow Preventers (ASSE 1052)	X[a]	X	X[a]	X	X[a]	X	X[a]	X
Hose Connection Vacuum Breakers (CAN/CSA B64.2 and B64.2.2)	X[a]	X	X[a]	X	X[a]	X	X[a]	X
Hose Connection Vacuum Breakers (ASSE 1011)	X[a]	X	X[a]	X	X[a]	X	X[a]	X
Pipe Applied Atmospheric Type Vacuum Breakers (ASSE 1001)						X		X
Pressure Vacuum Breaker Assembly (ASSE 1020)					X	X	X	X
Reduced Pressure Principle Backflow Preventers And Reduced Pressure Fire Protection Principle Backflow Preventers (ASSE 1013)	X	X	X	X	X	X	X	X
Reduced Pressure Principle Backflow Preventer (CAN/CSA B64.4)	X	X	X	X	X	X	X	X
Spill Resistant Vacuum Breaker (ASSE 1056 and CAN/CSA B64.1.3)					X	X	X	X
Vacuum Breaker (CAN/CSA B64.1.2)					X	X	X	X

[a] See limitation listed under s. SPS 382.41 (4) (c) 1. a.

Table 382.41−2

Acceptable Cross Connection Control Methods, Devices or Assemblies for Specific Applications

Methods or Assemblies (Standard)	Types of Application or Use
Backflow Preventer for Beverage Dispensing Machines (ASSE 1022)	Beverage dispensers
Chemical Dispensing Systems (ASSE 1055)	Chemical dispensing systems
Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies (ASSE 1015)	Automatic fire sprinkler systems and standpipe systems Water−based fire protection system
Double Check Detector Fire Protection Backflow Prevention Assemblies (ASSE 1048)	Automatic fire sprinkler systems and standpipe systems Water−based fire protection system
Double Check Detector Valve Type Backflow Preventer (CAN/CSA B64.5)	Automatic fire sprinkler systems and standpipe systems Water−based fire protection system
Dual Check Backflow Preventer Wall Hydrant — Freeze Resistant Type (ASSE 1053)	Hose threaded outlet connection
Hand Held Showers (ASSE 1014)	Hand held shower assemblies
Laboratory Faucet Type Vacuum Breakers (CAN/CSA B64.7)	Laboratory faucets
Laboratory Faucet Vacuum Breakers (ASSE 1035)	Laboratory faucets
Pressurized Flushing Devices (Flushometers) For Plumbing Fixtures (ASSE 1037)	Flushometer plumbing fixtures
Reduced Pressure Detector Fire Prevention Backflow Prevention Assemblies (ASSE 1047)	Automatic fire sprinkler systems
Trap Seal Primer Valves, Water Supply Fed (ASSE 1018)	Traps for drain systems
Vacuum Breaker Tees [s. SPS 382.41 (5) (j)]	Water treatment devices
Wall Hydrants, Frost Proof Automatic Draining Anti−Backflow Type (ASSE 1019), types A or B	Hose threaded outlet connections
Water Closet Flush Tank Ball Cocks (ASSE 1002)	Gravity water closet flush tanks

(4) LIMITATIONS. (a) Cross connection control devices shall be limited in use in accordance with the respective standard, unless otherwise specifically permitted under this subsection.

(b) 1. Except for a deck−mounted device, a pipe applied atmospheric vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device is at least 6″ above all of the following:

a. The flood level rim of the receptor serving the water supply port.

b. The highest point downstream from the device where backpressure would be created.

c. The highest point of an injection or aspiration port.

2. A deck−mounted pipe applied atmospheric type vacuum breaker shall be installed such that the bottom of the device or the critical level mark on the device is at least one inch above all of the following:

a. The flood level rim of the receptor serving the water supply port.

b. The highest point downstream from the device where backpressure would be created.

c. The highest point of an injection or aspiration port.

(c) 1. a. The use a of a hose connection backflow preventer, dual check backflow preventer wall hydrant−freeze resistant or a hose connection vacuum breaker in a continuous pressure situation shall be limited to campgrounds and marinas.

b. The use of a hose connection backflow preventer and a hose connection vacuum breaker shall be limited to the discharge side of a control valve such as a faucet or hose bibb.

2. A hose connection backflow preventer and a hose connection vacuum breaker may not be employed in backpressure situations of more than 10 feet of water column.

(d) A backflow preventer with intermediate atmospheric vent:

1. May not be employed in backpressure situations of more than 150 psig; and

2. May not serve boilers having a maximum steam pressure setting greater than 15 psig or a maximum water pressure setting greater than 30 psig.

(e) 1. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer may not be subjected to a backpressure greater than twice the rated working pressure of the device.

2. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which serve a water−based fire protection system may have a test outlet located between the number 2 check valve and the number 2 listed indicating control valve.

3. A reduced pressure principle backflow preventer and a reduced pressure detector backflow preventer which are 2” or smaller in size and which serve a water−based fire protection system are not required to have a test cock on the number one listed indicating control valve.

(f) A hand−held shower may not be employed in backpressure situations of more than 5 feet of water column.

(g) 1. A double check backflow prevention assembly and a double check detector assembly backflow preventer may not be subjected to a backpressure greater than twice the rated working pressure of the device.

2. A double check backflow prevention assembly and a double check detector assembly backflow preventer which serve a water−based fire protection system may have a test outlet located between the number 2 check valve and the number 2 listed indicating control valve.

3. A double check backflow prevention assembly and a double check detector assembly backflow preventer which are 2" or smaller in size and which serve a water−based fire protection system are not required to have a test cock on the number one listed indicating control valve.

(h) A water supply fed trap seal primer valve shall be installed such that the bottom of the device or the critical level as marked on the device is at least 12" above:

1. The connection to the trap; and

2. The highest point downstream from the device where backpressure would be created.

(i) A vacuum breaker wall hydrant, freeze resistant automatic draining type or a freeze resistant sanitary yard hydrant, may not be employed in backpressure situations of more than 10 feet of water column.

(k) 1. A pressure type vacuum breaker assembly shall be installed such that the bottom of the device or the critical level mark on the device is at least 12" above all of the following:

a. The flood level rim of the receptor serving the water supply port.

b. The highest point downstream from the device where backpressure would be created.

c. The highest point of an injection or aspiration port.

2. A pressure vacuum breaker assembly shall be located only outside.

(L) A laboratory faucet backflow preventer may not be employed in backpressure situations of more than 6 feet of water column.

(m) The cross connection control device to serve a hose bibb or hydrant that penetrates an exterior wall of a heated structure may not prevent a hose bibb or hydrant from being freeze resistant automatic draining as required under s. SPS 382.40 (8) (a).

(n) A spill resistant vacuum breaker shall be installed so that the bottom of the device or the critical level mark on the device is at least 12" above all of the following:

1. The flood level rim of the receptor serving the water supply port.

2. The highest point downstream from the device where back pressure would be created.

3. The highest point of an injection or aspiration port.

(5) INSTALLATION. (a) An air gap for cross connection control shall conform to ASME A112.1.2.

Note: See ch. SPS 382 Appendix for further explanatory material.

(b) Cross connection control methods, devices and assemblies shall be installed in accordance with the manufacturer's written installation specifications and this chapter. The methods, devices and assemblies shall be accessible for inspection, testing, maintenance and replacement.

Note: See s. SPS 384.30 (5) (c).

(c) Cross connection control devices shall be protected from freezing.

(d) 1. A cross connection control device may not be located in uninhabitable spaces susceptible to flooding.

2. A cross connection control device which has one or more vent ports may not be located in a pit, vault or depression which is below the adjacent grade or floor level, even if the pit, vault or depression is provided with a drain at the bottom of the pit.

(e) 1. Vent ports of cross connection control devices shall be positioned:

a. Away from areas where toxic gases and fumes may accumulate;

b. Downward or protected to protect the ports from falling debris; and

c. So as to drain dry.

2. Cross connection control devices or assemblies shall be so located that any vent ports are provided with an air gap so as to comply with s. SPS 382.33 or ASME A112.1.3.

3. a. If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is located within a building, a drain or receptor shall be provided to receive the discharge from the vent ports of the device. If a floor drain is to receive the discharge from the vent ports of a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer, the flow or pathway of the discharge may not create a nuisance.

b. Where drain piping is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the drain piping.

c. Where a receptor is provided for the discharge from a vent port, an air gap in accordance with par. (a) shall be provided between the vent port and the receptor.

(f) The installation of a reduced pressure principle backflow preventer, a reduced pressure fire protection principle backflow preventer, a reduced pressure detector backflow preventer, a reduced pressure detector fire protection backflow prevention assembly, a double check backflow prevention assembly, a double check detector assembly backflow preventer, a pressure vacuum breaker assembly and a spill resistant vacuum beaker shall conform to all of the following limitations:

1. The minimum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be less than 12".

2. The maximum distance between the floor, surface or platform which is to provide access and the lowest point of the assembly may not be more than 7 feet.

3. The minimum distance between a ceiling or other obstruction and the highest point of the assembly may not be less than 18".

4. The minimum distance between a wall or other obstruction and the back and ends of the assembly may not be less than 4".

5. The minimum distance between a wall or other obstruction and the front of the assembly may not be less than 24".

Note: See ch. SPS 382 Appendix for further explanatory material.

(g) The discharge outlet of local waste piping serving a cross connection control device shall be visible and not be located within a concealed space.

(h) No control valve may be placed downstream from a pipe applied atmospheric type vacuum breaker or a laboratory faucet backflow preventer.

(i) A barometric loop to provide cross connection control for backsiphonage shall be formed by creating a loop in the potable water supply piping upstream to the source of cross connection.

1. The loop shall extend at least 35 feet above:

a. The highest point downstream from the loop where backpressure would be created; and

b. The point of discharge.

2. No outlets for potable water use shall be installed downstream of the peak of the loop.

(j) Vacuum breaker tees shall be assembled such that:

1. The bottom of the horizontal portion of the tee is installed at least one inch above the flood level rim of the receptor;

2. The inside diameter of the tee is equal to or greater than the inside diameter of the drain piping from the water treatment device;

3. The tee is installed in such a position that the discharge will not create a nuisance;

4. The piping upstream of the tee is of a type suitable for water distribution in accordance with s. SPS 384.30 (4) (e).

5. The vent portion of the tee is equal to or greater than the inside diameter of the drain piping from the water treatment device; and

6. The vent port of the tee is:

a. Positioned away from areas where toxic gases and fumes may accumulate; and

b. Constructed to protect the port from falling debris.

(k) A chemical dispensing system shall be connected to the water distribution system in either of the following manners:

1. The fixture supply shall be individually connected to the water distribution system.

2. The fixture supply shall be installed with a pressure bleeding device. The pressure bleeding device shall create a visually free flow of water through the atmosphere from the faucet connection into the fixture drain.

History: 1−2−56; r. (2) through (7), Register, October, 1971, No. 190, eff. 11−1−71; r. and recr. Register, November, 1972, No. 203, eff. 12−1−72; renum. from H 62.14, Register, July, 1983, No. 331, eff. 8−1−83; renum. from ILHR 82.14 and am. (1) (h) 17., r. (2), Register, February, 1985, No. 350, eff. 3−1−85; r. and recr. Register, February, 1994, No. 458, eff. 3−1−94; am. (2) (a), Tables 82.41−1, 2, (4) (c), (e) to (i), (k) to (m), (5) (e) 3. a., (i), cr. (4) (n), r. and recr. (5) (b), (f), r. (5) (h), Register, February, 1997, No. 494, eff. 3−1−97; correction in (4) (n) made under s. 13.93 (2m) (b) 1., Stats., Register, February, 2000, No. 530; am. (3) (a) 2., (4) (k) 1. and (5) (a), r. and recr. (4) (b) and (n), and Tables 82.41−1 and 82.41−2, cr. (4) (k) 1. c. and (5) (L), Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: am. (3) (intro.), (5) (a), Tables 82.41−1 and 2, renum. (5) (i) to (L) to be (5) (h) to (k) Register April 2003 No. 568, eff. 5−1−03; CR 04−035: cr. (3) (b) 4. d., am. Tables 82.41−1 and −2, 82.41 (2), (3) (a) 1. and (b) 7. Register November 2004 No. 587, eff. 12−1−04; CR 08−055: cr. (3) (b) 4. e., am. (4) (c) 1. a., (f), (i), (n), (5) (a), (e) 2., (f) (intro.), Tables 82.41−1 and 82.41−2 Register February 2009 No. 638, eff. 3−1−09; corrections in (6) made under s. 13.92 (4) (b) 1. and 7., Stats., Register February 2009 No. 638; CR 09−050: r. (6) Register December 2009 No. 648, eff. 1−1−10; CR 10−064: am. (1), (5) (e) 2., Table 82.41−2 Register December 2010 No. 660, eff. 1−1−11; correction in (2) (a), (b), (3) (a) 1., (b) 7., (4) (m), (5) (e) 2., (j) 4., Table 382.41−1, Table 382.41−2 made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter V — Special Plumbing Installations

SPS 382.50 Health care and related facilities. **(1)** GENERAL. The provisions of this section shall set forth the requirements for the design, installation and maintenance of devices, fixtures and equipment which are installed in health care and related facilities.

(2) FIXTURES AND EQUIPMENT. (a) *Special fixtures and equipment.* 1. 'Requirements for ice manufacture and storage.' Machines for manufacturing ice or any device for handling or storage of ice shall be located in an area not subject to contamination.

2. 'Sterilizers and washer sanitizers.' a. Sterilizers and washer sanitizers shall discharge by means of indirect waste.

b. The indirect waste piping shall discharge by means of air−gap.

3. 'Aspirators.' Aspirators which require the use of water shall be provided with approved cross connection control.

(b) *Spouts and actions*. The selection of spouts and actions on plumbing fixtures shall comply with this section and Table 382.50−1.

1. 'Spouts'. Lavatories and sinks accessible to patients shall have the water supply spout mounted so that its discharge point is a minimum distance of 5" above the flood level rim of the fixture.

2. 'Actions.' All fixtures used by medical and nursing staff, and all lavatories used by patients and food handlers shall be equipped with valves that can be operated without the use of hands. Where wrist blade handles are used for this purpose, the handles shall not exceed 4 1/2" in length, except handles on scrub sinks and clinical sinks shall be no less than 6" long.

(c) *Floor drain prohibition.* 1. Except as provided in subd. 2., floor drains may not be installed in operating or delivery rooms.

2. Floor drains may be installed in cystoscopic rooms. The drain shall contain a non−splash, horizontal−flow flushing bowl beneath the drain plate.

(3) WATER SUPPLY SYSTEMS. (a) *Hospital water supply systems.* Water supply systems serving hospitals shall comply with all of the following:

1. All hospitals shall be provided with at least 2 water services. Whenever more than one water main is available, the connections shall be made to different water mains.

2. Each water service connection shall adequately serve the total building water supply demand as specified in s. SPS 382.40 (7).

Note: The installation of two water services or a private water main may require the installation of a check valve. Refer to ch. NR 811 for more information.

(b) *Hospital, community−based residential facility, inpatient hospice and nursing home water supply systems.* 1. Water supply systems serving a hospital, community−based residential facility, inpatient hospice or nursing home shall comply with all of the following:

a. Except as provided in subd. 1. b., a single control valve may serve an area where 4 or fewer patient care units exist and where each unit contains not more than 2 persons.

b. A water supply serving an intensive care patient care unit shall be individually valved.

2. All water distribution piping shall be insulated in accordance with chs. SPS 361 to 366.

3. Cold water shall be supplied to lavatories or sinks located in patient rooms.

4. A hot water distribution system shall be under constant recirculation to provide continuous hot water at each hot water outlet, except that uncirculated hot water distribution piping may not exceed 25 feet in developed length.

5. Water provided to patient showers, therapeutic equipment and all types of baths shall be installed with control valves which automatically regulate the temperature of the water supply to the fixture fitting outlet within a temperature range of 110°F to 115°F. Such control valves shall automatically reduce flow to 0.5 gpm or less when the water supply to the fitting outlet exceeds 115°F or when loss of cold water pressure occurs.

Note: See ch. SPS 382 Appendix A−382.50 (3) (b) 5. for sketches showing various design options.

6. Hot water distribution systems shall be installed and maintained to provide bacterial control by one of the following methods:

a. Water stored and circulation initiated at a minimum of 140°F and with a return of a minimum of 124°F.

b. Water chlorinated at 2 mg/L residual.

Note: Additional information may be contained in ASHRAE Guideline 12−2000, Minimizing the Risk of Legionellosis Associated with Building Water Systems. This standard is published by the American Society of Heating, Refrigerating and Air−Conditioning Engineers (ASHRAE); 1791 Tullie Circle, N.E., Atlanta, GA 30329, phone: (800) 5−ASHRAE or (404) 636−8400 ext. 507; fax: (404) 321−5478; e−mail: orders@ashrae.org; or online at www.ashrae.org.

c. Another disinfection system approved by the department.

7. A water distribution system may not be designed, installed and maintained so that the maximum temperature to fixture fitting outlets accessible to patients exceeds 115°F.

Note: See s. SPS 382.40 (5) and ch. DHS 124 for additional requirements for circulation systems.

8. Except as provided in subd. 7., a water distribution system may not be designed, installed and maintained so that the maximum temperature to fixture fitting outlets exceeds 180°F.

Table 382.50−1
Spouts and Actions Required in Health Care and Related Facilities

Fixture Location	Type of Spout		Type of Action		
	Standard	Gooseneck or provide a 5−inch clearance	Hand	Wrist	Foot, Knee or Electronic Sensor
NURSING DEPARTMENT					
Patient toilet room		X		X	X
Patient toilet room, isolation		X			X
Utility room		X		X	X
Treatment room		X		X	X
Medicine room		X		X	X
Kitchen floor lavatory		X		X	X
Kitchen floor sink	X	X		X	X
Nurses toilet room	X	X	X	X	X
Floor laboratory		X	X	X	X
NURSERY					
Nursery		X		X	X
Exam/treatment room		X		X	X
Infant intensive care unit		X			X
Labor room		X		X	X
SURGICAL					
Scrub room		X [a]			X
Sub−sterile room	X	X		X	X
Clean−up room	X	X		X	X
Frozen sections room		X	X	X	X
Surgical supply room		X		X	X
Work room	X	X		X	X
Cystoscopic room		X [a]		X	X
Fracture room	X	X		X	X
Recovery room		X			X
CENTRAL SUPPLY					
Work room	X	X		X	X
Solutions room	X	X		X	X
Pharmacy		X	X	X	X
Manufacturing		X		X	X
EMERGENCY DEPARTMENT					
Observation bedroom		X		X	X
Utility room		X		X	X
Operating room		X [a]			X
Exam room		X		X	X
DIAGNOSTIC AND TREATMENT					
Occupational therapy room		X		X	X
Hydro−therapy room		X		X	X
Exam/treatment room		X		X	X
Radium treatment/exam room		X		X	X
Toilet room		X		X	X
Dark room		X		X	X
Autopsy room		X [a]			X
Lavatory in autopsy shower room		X	X	X	X
Laboratory		X	X	X	X

Table 382.50−1 (Continued)
Spouts and Actions Required in Health Care and Related Facilities

Fixture Location	Type of Spout		Type of Action		
	Standard	Gooseneck or provide a 5−inch clearance	Hand	Wrist	Foot, Knee or Electronic Sensor
CLINIC OR OUTPATIENT DEPARTMENT					
Exam/treatment room		X		X	X
Dental operating room		X			X
Dental laboratory		X	X	X	X
Dental recovery room		X		X	X
Surgical room		X [a]			X
Eye exam room		X			X
Ear, nose and throat exam room		X			X
SERVICE DEPARTMENT					
Lavatory in kitchen	X	X		X	X

X = Spout and action meet required type.

[a] Spout includes a spray head.

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; r. (10) (f) and Table 25, Register, February, 1994, No. 458, eff. 3−1−94; correction in (7) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, July, 2000, No. 535; am. (2) and (10) (g) Table 26, r. and recr. (10) (g) and (h), r. (10) (i), Register, December, 2000, No. 540, eff. 1−1−01; CR 02−002: r. and recr. Register April 2003 No. 568, eff. 5−1−03; CR 04−035: am. Table 82.50−1 and (3) (b) 5. Register November 2004 No. 587, eff. 12−1−04; correction in (3) (b) 2. made under s. 13.92 (4) (b) 7., Stats., Register February 2008 No. 626; CR 08−055: am. (3) (b) 5. Register February 2009 No. 638, eff. 3−1−09; correction in (2) (b) (intro.), (3) (a) 2., (b) 2. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

SPS 382.51 Manufactured homes and manufactured home communities. (1) DRAIN SYSTEMS. Except as provided in pars. (a) and (b), the building sewers and private interceptor main sewers serving a manufactured home or manufactured home community shall comply with s. SPS 382.30.

(a) The minimum slope of the aboveground building sewer shall be 1/8 inch per foot.

(b) For manufactured homes, the most upstream point of the building sewer shall be determined at the connection with the building drain installed by the manufactured home manufacturer prior to delivery.

(c) The above ground building sewer shall be constructed of materials suitable for above ground drain and vent as specified in s. SPS 384.30 (2) (a).

(2) WATER SUPPLY SYSTEMS. (a) Except as provided in pars. (b) and (c), the water services and private water mains for a manufactured home or manufactured home community shall comply with s. SPS 382.40.

(b) The above ground water service shall be constructed of materials approved for water distribution as specified in s. SPS 384.30 (4) (e).

(c) The curb stop serving an individual manufactured home shall terminate outside the perimeter of the manufactured home.

(d) For manufactured homes, the most downstream point of the water service shall be determined at the connection with the water distribution piping by the manufactured home manufacturer prior to delivery.

(3) MANUFACTURED HOME CONNECTIONS. (a) Frost sleeves for plumbing serving a manufactured home shall conform to all of the following:

1. Water service and building sewer connections shall be provided with frost sleeves extending to within 6 inches of the top of the below ground horizontal building sewer or water service, or to a depth at least 6 inches below the predicted depth of frost in accordance with Table 382.30−6.

2. The frost sleeve shall terminate at least 2 inches above grade.

3. The sleeve shall be constructed of material approved for building drain or building sewer material as specified in s. SPS 384.30 (2).

(b) Termination of the water service and building sewer shall conform to all of the following:

1. The manufactured home water service for connection to the manufactured home shall terminate a minimum of 6 inches above the surrounding finished grade.

2. The manufactured home building sewer for connection to the manufactured home shall terminate a minimum of 4 inches above the surrounding finished grade and may not terminate higher than the water service.

(c) The manufactured home water service and building sewer shall be capped or plugged when not connected to a manufactured home.

Note: See ch. SPS 382 Appendix A−382.51 (3) for further explanatory material.

History: Cr. Register, February, 1985, No. 350, eff. 3−1−85; r. and recr. Table, Register, August, 1991, No. 428, eff. 9−1−91; am. (2) (d), Register, February, 1994, No. 458, eff. 3−1−94; CR 02−002: r. and recr. Register April 2003 No. 568, eff. 5−1−03; CR 08−055: am. Register February 2009 No. 638, eff. 3−1−09; correction in (1) (intro.), (c), (2) (a), (b), (3) (a) 1., 3. made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter VI — Installation

SPS 382.60 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.

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 382.60. 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" 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.

(d) Shower valves and piping from the shower valve to the shower head outlet shall be securely attached to the structure.

Table 382.60

Support Spacing

Material	Maximum Horizontal Spacing (feet)	Maximum Vertical Spacing (feet)
Acrylonitrile Butadiene Styrene (ABS)	4	10
Brass	10	10
Cast iron	5[a]	15
Copper or Copper–Alloy Pipe	12	10
Copper or Copper–Alloy Tubing:		
≤ 1¼″ diameter[c]	6	10
≥ 1½″ diameter[c]	10	10
Chlorinated Polyvinyl Chloride (CPVC):		
≤ 1″ diameter[c]	3	5[b]
≥ 1¼″ diameter[c]	4	6[b]
Crosslinked Polyethylene (PEX)	2 2/3	4
Ductile Iron	5[a]	15
Galvanized Steel	12	15
Lead	Continuous	4
Polybutylene (PB)	2 ft. 8 in.	4
Polyethylene (PE)	2	4
Polypropylene (PP)	2	4
Polyvinylidene Fluoride (PVDF)	2	4
Polyvinyl Chloride, flexible (PVC)	2	4
Polyvinyl Chloride (PVC)	4	10
Stainless Steel	12	15

[a] The maximum horizontal spacing for supports may be increased to 10 feet when 10–foot lengths of pipe are employed.
[b] Mid–story guide is to be employed.
[c] "≥" means greater than or equal to.
"≤" means less than or equal to.

History: Cr. Register, February, 1985, No. 350, eff. 3–1–85; r. and recr. Register, May, 1988, No. 389, eff. 6–1–88; r. and recr. Table 82.60, Register, February, 1994, No. 458, eff. 3–1–94; cr. (2) (d), Register, December, 2000, No. 540, eff. 1–1–01; CR 02–002: am. Table Register April 2003 No. 568, eff. 5–1–03; correction in (2) (a) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Subchapter VII — Plumbing Treatment Standards

SPS 382.70 Plumbing treatment standards. **(1)** PURPOSE. The purpose of this section is to establish plumbing treatment standards for plumbing systems that supply water to outlets based on the intended use.

(2) SCOPE. The provisions of this section apply to plumbing systems that supply water to outlets.

Note: For requirements and specifications for POWTS, refer to ch. SPS 383.

Note: The department of natural resources requires WPDES permits for point source discharges under ch. 283, Stats.

(3) GENERAL REQUIREMENTS. A plumbing system shall supply water that is of a quality that will protect public health and the waters of the state and be suitable for the intended use.

Note: Refer to s. SPS 382.34 for requirements for wastewater reuse.

(4) MINIMUM REQUIREMENTS. (a) Except as provided under par. (b), a plumbing system shall supply a quality of water at the outlet or at the termination of the plumbing system that meets or exceeds the minimum requirements as specified in Table 382.70–1.

(b) For an outlet other than a plumbing fixture, appliance or appurtenance, there may be more stringent requirements assigned by a municipality, governmental unit, state agency or the owner of the plumbing system.

Table 382.70–1
Plumbing Treatment Standards

Intended Use	Plumbing Treatment Standards [f]
1. Drinking, cooking, food processing, preparation and cleaning, pharmaceutical processing and medical uses	NR 811 and 812 approved sources
2. Personal hygiene, bathing and showering	NR 811 and 812 approved sources
3. Automatic fire protection systems	As acceptable by local authority
4. Swimming pool makeup water	NR 811 and 812 approved sources
5. Swimming pool fill water	DHS 172 requirements
6. Cooling water [b]	pH 6 – 9 [b] ≤ 50 mg/L BOD_5 ≤ 30 mg/L TSS Free chlorine residual 1.0 – 10.0 mg/L[b]
7. Subsurface infiltration and irrigation, using reuse as the source [c]	≤ 15 mg/L oil and grease ≤30 mg/L BOD_5 ≤35 mg/L TSS < 200 fecal coliform cfu/100 mL [d]
8. Subsurface infiltration and irrigation, using stormwater as the source [c]	< 15 mg/L oil and grease < 60 mg/L TSS
9. Surface or spray irrigation using stormwater and clearwater as the source [c]	≤ 10 mg/L BOD_5 ≤ 5 mg/L TSS
10. Surface irrigation except food crops, vehicle washing, clothes washing, air conditioning, soil compaction, dust control, washing aggregate and making concrete [a, c]	pH 6 – 9 [b] ≤10 mg/L BOD_5 ≤ 5 mg/L TSS Free chlorine residual 1.0 – 10.0 mg/L[b]
11. Toilet and urinal flushing	pH 6 – 9 [b] 200 mg/L BOD_5 ≤ 5 mg/L TSS Free chlorine residual .1 mg/L – 4.0 mg/L [b]
12. Uses not specifically listed above	Contact department for standards

[a] Refer to the department of agriculture, trade and consumer protection for commercial use.

[b] Applies only to wastewater treatment devices for reuse systems. Other equivalent disinfection methods may be approved by the department.

[c] These requirements do not apply to the treatment of industrial wastewater or other wastewater discharges that are subject to a WPDES permit issued by the department of natural resources.

[d] A 12−inch minimum separation of medium sand or finer material above high groundwater or bedrock.

[f] For stormwater, the plumbing treatment standards are based on an annual average. Evaluation of research to prove compliance with this table is based on the geometric mean of the data acceptable to the department or an equivalent method.

History: CR 02−002: cr. Register April 2003 No. 568, eff. 5−1−03; CR 04−035: am. Table 82.70−1 Register November 2004 No. 587, eff. 12−1−04; CR 08−055: am. Table 82.70−1 Register February 2009 No. 638, eff. 3−1−09; CR 10−064: am. Table 82.70−1 Register December 2010 No. 660, eff. 1−1−11; correction in (4) (a) made under s. 13.92 (4) (b) 7., Stats., Register December 2011 No. 672.

Lead In Construction

Health Hazards of Lead Exposure

Pure lead (Pb) is a heavy metal at room temperature and pressure. A basic chemical element, it can combine with various other substances to form numerous lead compounds.

Lead has been poisoning workers for thousands of years. Lead can damage the central nervous system, cardiovascular system, reproductive system, hematological system, and kidneys. When absorbed into the body in high enough doses, lead can be toxic. In addition, workers' lead exposure can harm their children's development.

Short-term (acute) overexposure–as short as days--can cause acute encephalopathy, a condition affecting the brain that develops quickly into seizures, coma, and death from cardio respiratory arrest. Short-term occupational exposures of this type are highly unusual but not impossible.

Extended, long-term (chronic) overexposure can result in severe damage to the central nervous system, particularly the brain. It can also damage the blood-forming, urinary, and reproductive systems.

There is no sharp dividing line between rapidly developing acute effects of lead and chronic effects that take longer to develop.

Symptoms of Chronic Overexposure

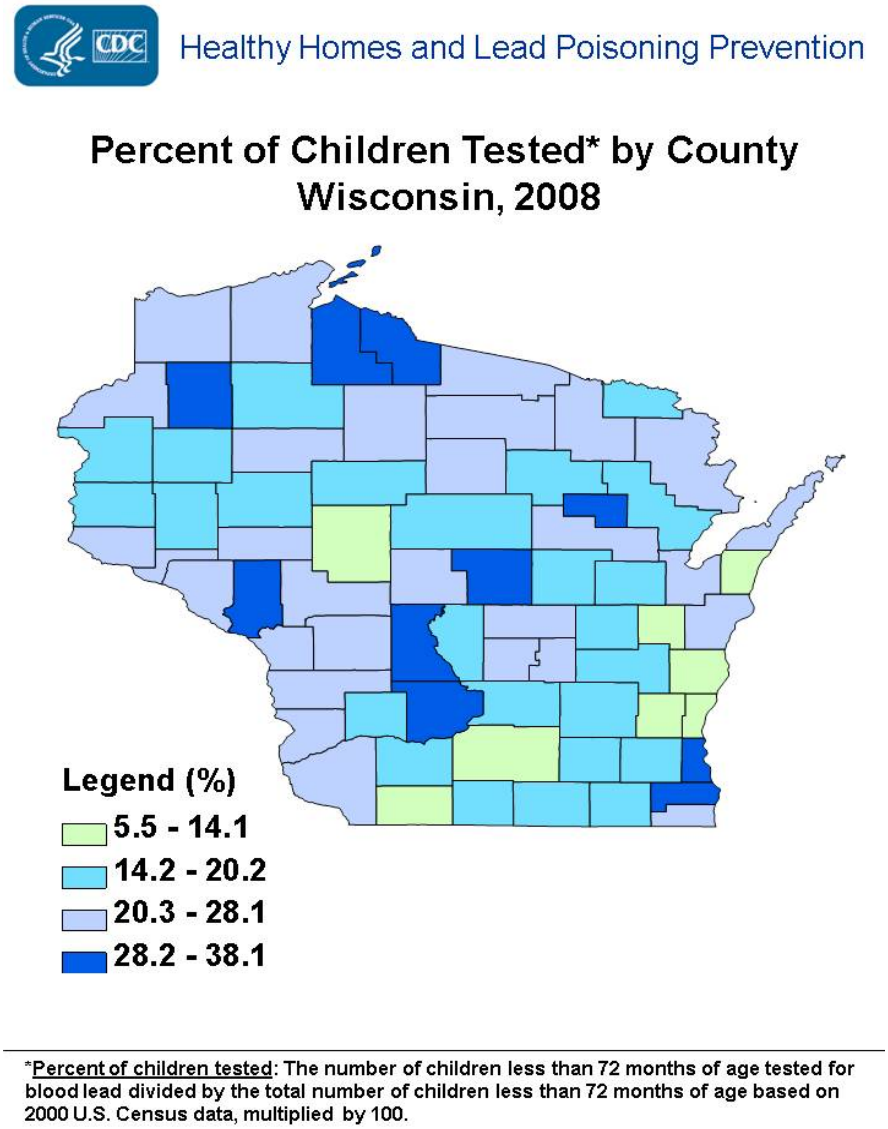
Some of the common symptoms include:

- Loss of appetite;
- Constipation;
- Nausea;
- Excessive tiredness;
- Headache;
- Fine tremors;
- Colic with severe abdominal pain;
- Metallic taste in the mouth;
- Weakness;
- Nervous irritability;
- Hyperactivity;
- Muscle and joint pain or soreness;
- Anxiety;
- Pallor;
- Insomnia;
- Numbness;
- Dizziness

Reproductive Risks

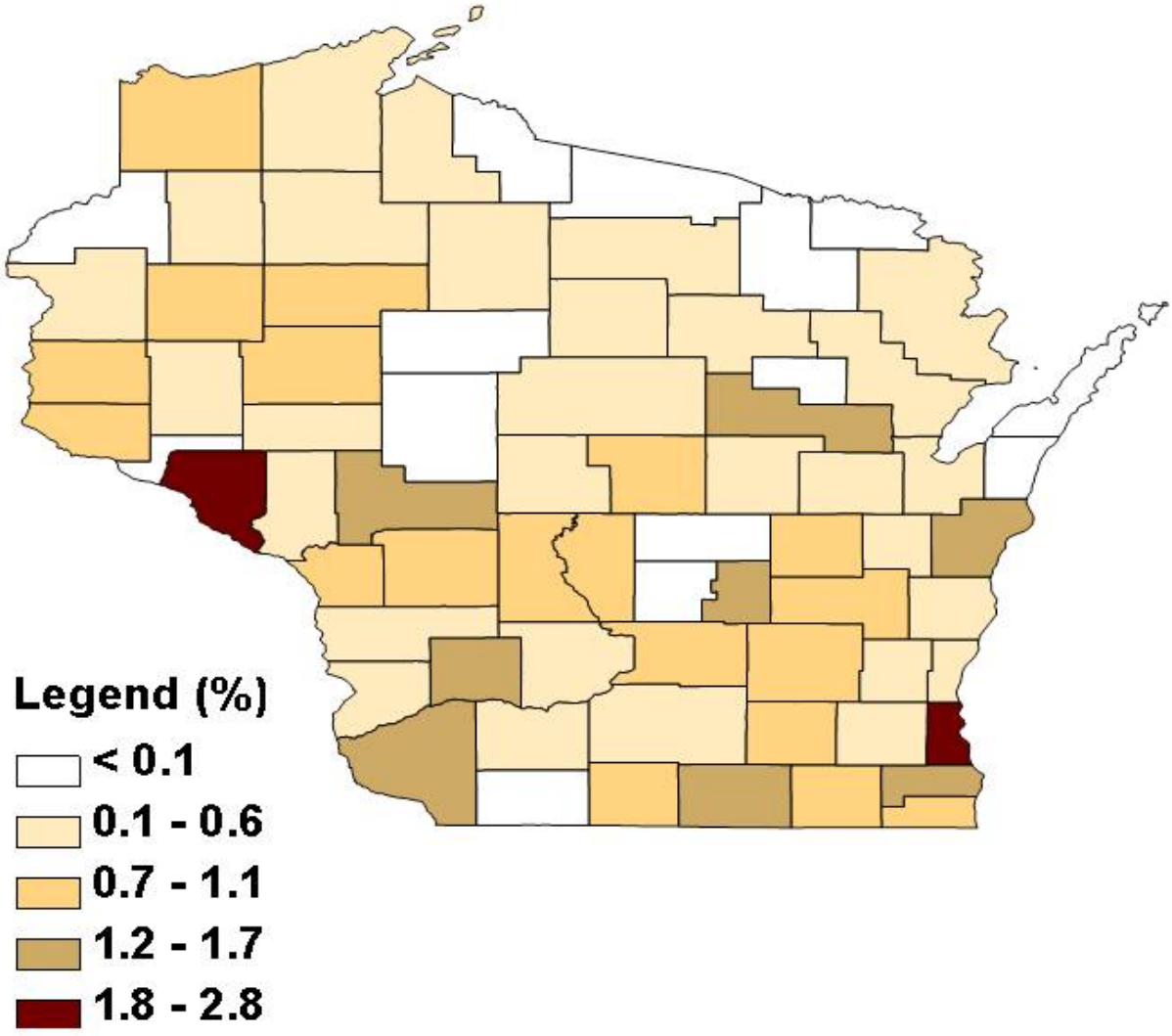
Lead is toxic to both male and female reproductive systems. Lead can alter the structure of sperm cells and there is evidence of miscarriage and stillbirth in women exposed to lead or whose partners have been exposed. Children born to parents who were exposed to excess lead levels are more likely to have birth defects, mental retardation, or behavioral disorders or to die during the first year of childhood.

Workers who desire medical advice about reproductive issues related to lead should contact qualified medical personnel to arrange for a job evaluation and medical followup--particularly if they are pregnant or actively seeking to have a child. Employers whose employees may be exposed to lead and who have been contacted by employees with concerns about reproductive issues must make medical examinations and consultations available.



Healthy Homes and Lead Poisoning Prevention

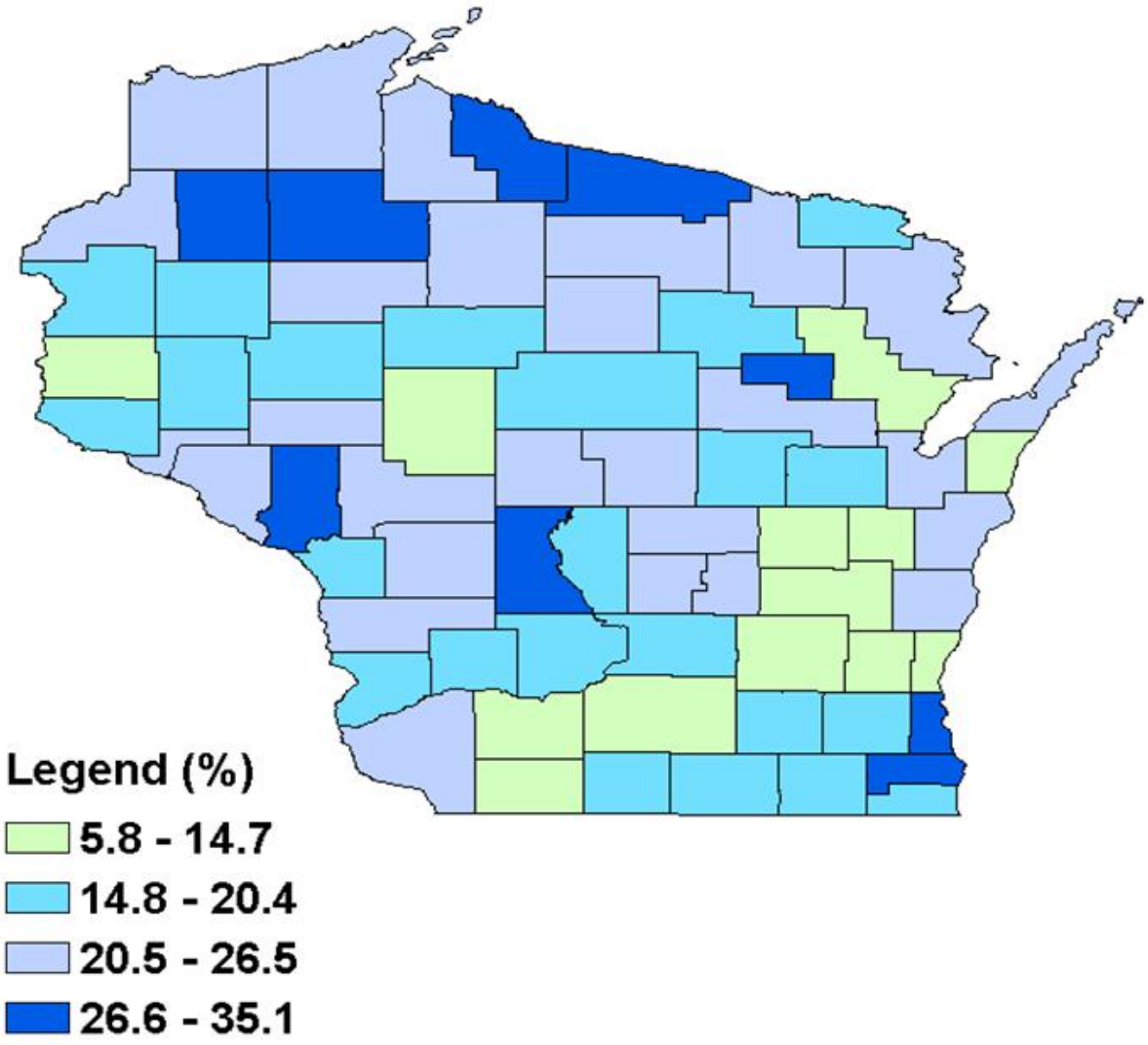
Percent of Children with Elevated Blood Lead Levels* by County Wisconsin, 2008



*Percent of children with elevated blood lead levels: The number of children less than 72 months of age with a confirmed elevated blood lead level ≥10 µg/dL divided by the number of children less than 72 months of age tested for blood lead, multiplied by 100.

Healthy Homes and Lead Poisoning Prevention

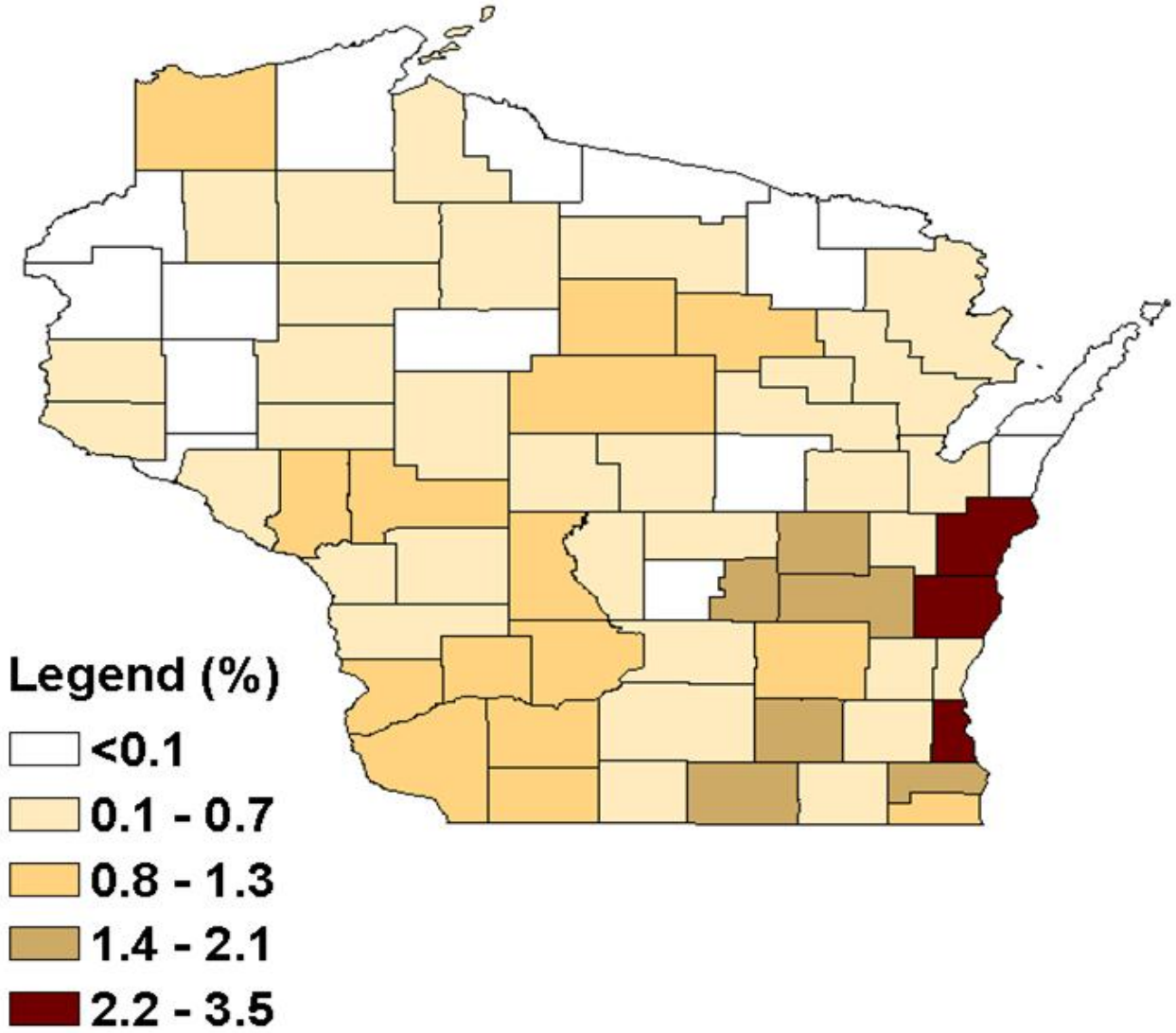
Percent of Children Tested* by County
Wisconsin, 2007



*Percent of children tested: The number of children less than 72 months of age tested for blood lead divided by the total number of children less than 72 months of age based on 2000 U.S. Census data, multiplied by 100.

Healthy Homes and Lead Poisoning Prevention

Percent of Children with Elevated Blood Lead Levels* by County Wisconsin, 2007



*Percent of children with elevated blood lead levels: The number of children less than 72 months of age with a confirmed elevated blood lead level ≥10 µg/dL divided by the number of children less than 72 months of age tested for blood lead, multiplied by 100.

Chelating Agents

Under certain limited circumstances, a physician may prescribe special drugs called chelating agents to reduce the amount of lead absorbed in body tissues. Using chelation as a preventive measure--that is, to lower blood level but continue to expose a worker--is prohibited and therapeutic or diagnostic chelations of lead that are required must be done under the supervision of a licensed physician in a clinical setting, with thorough and appropriate medical monitoring. The employee must be notified in writing before treatment of potential consequences and allowed to obtain a second opinion.

Worker Exposure

Lead is most commonly absorbed into the body by inhalation. When workers breathe in lead as a dust, fume, or mist, their lungs and upper respiratory tract absorb it into the body. They can also absorb lead through the digestive system if it enters the mouth and is ingested.

A significant portion of the lead inhaled or ingested gets into the bloodstream. Once in the bloodstream, lead circulates through the body and is stored in various organs and body tissues. Some of this lead is filtered out of the body quickly and excreted, but some remains in the blood and tissues. As exposure continues, the amount stored will increase if the body absorbs more lead than it excretes.

The lead stored in the tissue can slowly cause irreversible damage, first to individual cells, then to organs and whole body systems.

Construction Workers and Lead Exposure

How Lead Is Used

In construction, lead is used frequently for roofs, cornices, tank linings, and electrical conduits. In plumbing, soft solder, used chiefly for soldering tinplate and copper pipe joints, is an alloy of lead and tin. Soft solder has been banned for many uses in the United States. In addition, the Consumer Product Safety Commission bans the use of lead-based paint in residences.

Because lead-based paint inhibits the rusting and corrosion of iron and steel, however, lead continues to be used on bridges, railways, ships, lighthouses, and other steel structures, although substitute coatings are available.

Construction projects vary in their scope and potential for exposing workers to lead and other hazards. Projects such as removing paint from a few interior residential doors may involve limited exposure. Others projects, however, may involve removing or stripping substantial quantities of lead-based paints on large bridges and other structures.

How Widespread Is Lead based Paint In Housing?

1. 87% of homes built before 1940 have lead based paint components.
2. 69% of homes built during 1940 to 1959 have lead based paint components.
3. 24% of homes built during 1960 to 1978 have lead based paint components.

Most Vulnerable Workers

Workers potentially at risk for lead exposure include those involved in iron work; demolition work; painting; lead-based paint abatement; plumbing; heating and air conditioning maintenance and repair; electrical work; and carpentry, renovation, and remodeling work. Plumbers, welders, and painters are among those workers most exposed to lead. Significant lead exposures also can arise from removing paint from surfaces previously coated with lead-based paint such as bridges, residences being renovated, and structures being demolished or salvaged. With the increase in highway work, bridge repair, residential lead abatement, and residential remodeling, the potential for exposure to lead-based paint has become more common.

Workers at the highest risk of lead exposure are those involved in:

- Abrasive blasting and
- Welding, cutting, and burning on steel structures.

Other operations with the potential to expose workers to lead include:

- Lead burning;
- Using lead-containing mortar;
- Power tool cleaning without dust collection systems;
- Rivet busting;
- Cleanup activities where dry expendable abrasives are used;
- Movement and removal of abrasive blasting enclosures;
- Manual dry scraping and sanding;
- Manual demolition of structures;
- Heat-gun applications;
- Power tool cleaning with dust collection systems; and
- Spray painting with lead-based paint.

Remember:
A tiny amount of lead can be extremely harmful.

Leaded-dust particles are often so small that you cannot see them,
yet you can breathe or swallow them.

Adults can swallow or breathe dust during work activities.

OSHA's Lead Standard

OSHA's Lead Standard for the Construction Industry, Title 29 Code of Federal Regulations 1926.62, covers lead in a variety of forms, including metallic lead, all inorganic lead compounds, and organic lead soaps.

Exposure Limits

The standard establishes maximum limits of exposure to lead for all workers covered, including a permissible exposure limit (PEL) and action level (AL).

The PEL sets the maximum worker exposure to lead: 50 micrograms of lead per cubic meter of air (50μg/m3) averaged over an eight-hour period. If employees are exposed to lead for more than eight hours in a workday, their allowable exposure as a TWA for that day must be reduced according to this formula:

Employee exposure (in μg/m3) = 400 divided by the hours worked in the day.

The AL, regardless of respirator use, is an airborne concentration of 30μg/m3, averaged over an eight-hour period. The AL is the level at which an employer must begin specific compliance activities outlined in the standard.

Applicability To Construction

OSHA's lead in construction standard applies to all construction work where an employee may be exposed to lead. All work related to construction, alteration, or repair, including painting and decorating, is included. Under this standard, construction includes, but is not limited to:

- Demolition or salvage of structures where lead or materials containing lead are present;
- Removal or encapsulation of materials containing lead;
- New construction, alteration, repair, or renovation of structures, substrates, or portions or materials containing lead;
- Installation of products containing lead;
- Lead contamination from emergency cleanup;
- Transportation, disposal, storage, or containment of lead or materials containing lead where construction activities are performed; and
- Maintenance operations associated with these construction activities.

Remember

The EPA and the Wisconsin Dept. of Health Services have specific definitions of Lead based paint as well.

Federal definition:	**Wisconsin Definition:**
1 mg/cm2 of lead	0.7 mg/cm2 of lead
0.5% lead by weight, 5,000 ppm	0.06% lead by weight or 600ppm

Employer Responsibilities

Worker Protections

Employers of construction workers are responsible for developing and implementing a worker protection program. At a minimum, the employer's worker protection program for employees exposed to lead above the PEL should include:

- Hazard determination, including exposure assessment;
- Medical surveillance and provisions for medical removal;
- Job-specific compliance programs;
- Engineering and work practice controls;
- Respiratory protection;
- Protective clothing and equipment;
- Housekeeping;
- Hygiene facilities and practices;
- Signs;
- Employee information and training; and
- Recordkeeping.

Because lead is a cumulative and persistent toxic substance and health effects may result from exposure over prolonged periods, employers must use these precautions where feasible to minimize employee exposure to lead.

The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective, site specific worker protection program. These professionals may work independently or may be associated with an insurance carrier, trade organization, or onsite consultation program.

What is missing here? Anyone see any worker protection? How about acceptable Lead –Safe or Abatement work practices?

Elements Of A Compliance Program

For each job where employee exposure exceeds the PEL, the employer must establish and implement a written compliance program to reduce employee exposure to the PEL or below. The compliance program must provide for frequent and regular inspections of job sites, materials, and equipment by a competent person.

Written programs, which must be reviewed and updated at least every six months, must include:

- A description of each activity in which lead is emitted (such as equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices);
- The means to be used to achieve compliance and engineering plans and studies used to determine the engineering controls selected where they are required;
- Information on the technology considered to meet the PEL;
- Air monitoring data that document the source of lead emissions;
- A detailed schedule for implementing the program, including copies of documentation (such as purchase orders for equipment, construction contracts);
- A work practice program;
- An administrative control schedule, if applicable; and
- Arrangements made among contractors on multi-contractor sites to inform employees of potential lead exposure.

Can you use the same work practice program for the three examples below? Why or why not?

Hazard Assessment

An employer is required to conduct an initial employee exposure assessment of whether employees are exposed to lead at or above the AL based on:

- Any information, observation, or calculation that indicates employee exposure to lead;
- Any previous measurements of airborne lead; and
- Any employee complaints of symptoms attributable to lead exposure.

Objective data and historical measurements of lead may be used to satisfy the standard's initial monitoring requirements.

Initial Employee Exposure Assessment

Initial monitoring may be limited to a representative sample of those employees exposed to the greatest concentrations of airborne lead. Representative exposure sampling is permitted when there are a number of employees performing the same job, with lead exposure of similar duration and level, under essentially the same conditions. For employees engaged in similar work, the standard requires that the members of the group reasonably expected to have the highest exposure levels be monitored. This result is then attributed to the other employees of the group.

The employer must establish and maintain an accurate record documenting the nature and relevancy of previous exposure data. Instead of performing initial monitoring, the employer may in some cases rely on objective data that demonstrate that a particular lead containing material or product cannot result in employee exposure at or above the action level when it is processed, used, or handled.

According to the Wisconsin Dept. of Health Services (DHS 163):
(67) "Lead exposure" means a level of lead in the blood
of 10 or more micrograms per 100 milliliters of blood.

Biological Monitoring Tests

Analysis of blood lead samples must be conducted by an OSHA approved lab and be accurate (to a confidence level of 95 percent) within plus or minus 15 percent, or 6 μg/dl, whichever is greater. If an employee's airborne lead level is at or above the AL for more than 30 days in any consecutive 12 months, the employer must make biological monitoring available on the following schedule:

- At least every two months for the first six months and every six months thereafter for employees exposed at or above the action level for more than 30 days annually;
- At least every two months for employees whose last blood sampling and analysis indicated a blood lead level at or above 40 μg/dl; and
- At least monthly while an employee is removed from exposure due an elevated blood lead level.

Pending Employee Exposure Assessment

Until the employer performs an exposure assessment and documents that employees are not exposed above the PEL, OSHA requires some degree of interim protection for employees. This means providing respiratory protection, protective work clothing and equipment, hygiene facilities, biological monitoring, and training–as specified by the standards–for certain tasks prone to produce high exposure. These include:

- Manual demolition of structures such as dry wall, manual scraping, manual sanding, and use of a heat gun where lead containing coatings or paints are present;
- Power tool cleaning with or without local exhaust ventilation;
- Spray painting with lead-containing paint;
- Lead burning;
- Use of lead-containing mortar;
- Abrasive blasting, rivet busting, welding, cutting, or torch burning on any structure where lead-containing coatings or paint are present;
- Abrasive blasting enclosure movement and removal;
- Cleanup of activities where dry expendable abrasives are used; and
- Any other task the employer believes may cause exposures in excess of the PEL.

Here are some very basic examples of respiratory protection and protective work clothing. Depending on the work practices performed, more protection may be required.

BE AWARE OF YOUR RECORD KEEPING REQUIREMENTS:
The employer must notify each employee in writing of employee exposure assessment results within five working days of receiving them.

Test Results Showing No Overexposures

If the initial assessment indicates that no employee is exposed above the AL, the employer may discontinue monitoring. Further exposure testing is not required unless there is a change in processes or controls that may result in additional employees being exposed to lead at or above the AL, or may result in employees already exposed at or above the AL being exposed above the PEL.

The employer must keep a written record of the determination, including the date, location within the work site, and the name and social security number of each monitored employee.

Employee Notification Of Monitoring Results

The employer must notify each employee in writing of employee exposure assessment results within five working days of receiving them. Whenever the results indicate that the representative employee exposure, without the use of respirators, is above the PEL, the employer must include a written notice stating that the employee's exposure exceeded the PEL and describing corrective action taken or to be taken to reduce exposure to or below the PEL.

Medical Surveillance

When an employee's airborne exposure is at or above the AL for more than 30 days in any consecutive 12 months, an immediate medical consultation is required when the employee notifies the employer that he or she:

- Has developed signs or symptoms commonly associated with lead-related disease;
- Has demonstrated difficulty in breathing during respirator use or a fit test;
- Desires medical advice concerning the effects of past or current lead exposure on the employee's ability to have a healthy child;
- Is under medical removal and has a medically appropriate need.

Medical Exams

The best indicator of personal lead exposure is through a blood test to indicate elevated blood lead levels. A medical exam must also include:

- Detailed work and medical histories, with particular attention to past lead exposure (occupational and non-occupational), personal habits (smoking and hygiene), and past gastrointestinal, hematologic, renal, cardiovascular, reproductive, and neurological problems;
- A thorough physical exam, with particular attention to gums, teeth, hematologic, gastrointestinal, renal, cardiovascular, and neurological systems; evaluation of lung function if respirators are used;

- A blood pressure measurement;
- A blood sample and analysis to determine blood lead level;
- Hemoglobin and hematocrit determinations, red cell indices, and an exam of peripheral smear morphology; and
- Zinc protoporphyrin; blood urea nitrogen; and serum creatinine;
- A routine urinalysis with microscopic exam; and
- Any lab or other test the examining physician deems necessary.

Information For The Examining Physician

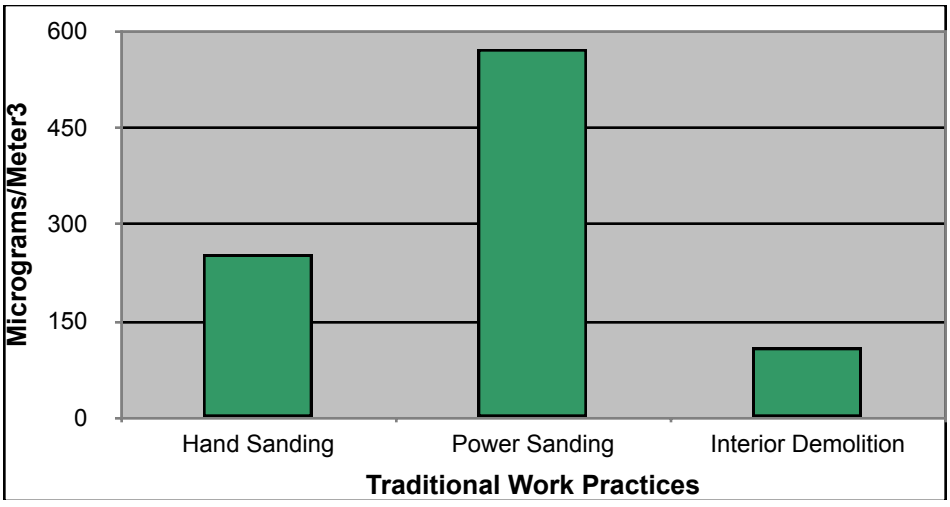
The employer must provide all examining physicians with a copy of the lead in construction standard, including all appendices, a description of the affected employee's duties as they relate to the employee's exposure, the employee's lead exposure level or anticipated exposure level, a description of personal protective equipment used or to be used, prior blood lead determinations, and all prior written medical opinions for the employee.

When Monitoring Shows No Employee Exposures Above The AL

Employers must make available, at no cost to the employee, initial medical surveillance for employees exposed to lead on the job at or above the action level on any one day per year. This initial medical surveillance consists of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporyrin (ZPP) levels. In addition, a medical surveillance program with biological monitoring must be made available to any employee exposed at or above the action level for more than 30 days in any consecutive 12 months.

Traditional Renovations Create Airborne Leaded Dust

(Source: EPA RRP Training Manual)



After The Medical Examination

Employers must obtain and provide the employee a copy of a written opinion from each examining or consulting physician that contains only information related to occupational exposure to lead and must include:

- Whether the employee has any detected medical condition that would increase the health risk from lead exposure;
- Any special protective measures or limitations on the worker's exposure to lead,
- Any limitation on respirator use; and
- Results of the blood lead determinations.

In addition, the written statement may include a statement that the physician has informed the employee of the results of the consultation or medical examination and any medical condition that may require further examination or treatment.

The employer must instruct the physician that findings, including lab results or diagnoses unrelated to the worker's lead exposure, must not be revealed to the employer or included in the written opinion to the employer. The employer must also instruct the physician to advise employees of any medical condition, occupational or non-occupational, that necessitates further evaluation or treatment. In addition, some states also require laboratories and health care providers to report cases of elevated blood lead concentrations to their state health departments.

Medical Removal Provisions

Temporary medical removal can result from an elevated blood level or a written medical opinion. More specifically, the employer is required to remove from work an employee with a lead exposure at or above the AL each time periodic and follow-up (within two weeks of the periodic test) blood sampling tests indicate that the employee's blood level is at or above 50 μg /dl. The employer also must remove from work an employee with lead exposure at or above the AL each time a final medical determination indicates that the employee needs reduced lead exposure for medical reasons. If the physician who is implementing the employer's medical program makes a final written opinion recommending the employee's removal or other special protective measures, the employer must implement the physician's recommendation.

For an employee removed from exposure to lead at or above the AL due to a blood lead level at or above 50 μg/dl, the employer may return that employee to former job status when two consecutive blood sampling tests indicate that the employee's blood lead level is below 40 μg /dl. For an employee removed from exposure to lead due to a final medical determination, the employee must be returned when a subsequent final medical determination results in a medical finding, determination, or opinion that the employee no longer has a detected medical condition that places the employee at increased risk of lead exposure.

The employer must remove any limitations placed on employees or end any special protective measures when a subsequent final medical determination indicates they are no longer necessary. If the former position no longer exists, the employee is returned consistent with whatever job assignment discretion the employer would have had if no removal occurred.

Worker Protections And Benefits

The employer must provide up to 18 months of medical removal protection (MRP) benefits each time an employee is removed from lead exposure or medically limited. As long as the position/job exists, the employer must maintain the earnings, seniority, and other employment rights and benefits as though the employee had not been removed from the job or otherwise medically

limited. The employer may condition medical removal protection benefits on the employee's participation in follow up medical surveillance.
If a removed employee files a worker's compensation claim or other compensation for lost wages due to a lead-related disability, the employer must continue medical removal protection benefits until the claim is resolved. However, the employer's MRP benefits obligation will be reduced by the amount that the employee receives from these sources. Also, the employer's MRP benefits obligation will be reduced by any income the employee receives from employment with another employer made possible by virtue of the employee's removal.

Records Requirements Involving Medical Removal

In the case of medical removal, the employer's records must include:

- The worker's name and social security number,
- The date of each occasion that the worker was removed from current exposure to lead,
- The date when the worker was returned to the former job status,
- A brief explanation of how each removal was or is being accomplished, and
- A statement indicating whether the reason for the removal was an elevated blood lead level.

Recordkeeping

Employer Requirements

The employer must maintain any employee exposure and medical records to document ongoing employee exposure, medical monitoring, and medical removal of workers. This data provides a baseline to evaluate the employee's health properly. Employees or former employees, their designated representatives, and OSHA must have access to exposure and medical records in accordance with 29 CFR 1910.1020. Rules of agency practice and procedure governing OSHA access to employee medical records are found in 29 CFR 1913.10

Exposure Assessment Records

The employer must establish and maintain an accurate record of all monitoring and other data used to conduct employee exposure assessments as required by this standard and in accordance with 29 CFR 1910.1020. The exposure assessment records must include:

- The dates, number, duration, location, and results of each sample taken, including a description of the sampling procedure used to determine representative employee exposure;
- A description of the sampling and analytical methods used and evidence of their accuracy;
- The type of respiratory protection worn, if any;
- The name, social security number, and job classification of the monitored employee and all others whose exposure the measurement represents; and
- Environmental variables that could affect the measurement of employee exposure.

Medical Surveillance Records

The employer must maintain an accurate record for each employee subject to medical surveillance, including:

- The name, social security number, and description of the employee's duties;
- A copy of the physician's written opinions;
- The results of any airborne exposure monitoring done for the employee and provided to the physician; and
- Any employee medical complaints related to lead exposure. In addition, the employer must keep or ensure that the examining physician keeps the following medical records:
- A copy of the medical examination results including medical and work history;
- A description of the laboratory procedures and a copy of any guidelines used to interpret the test results; and
- A copy of the results of biological monitoring. The employer or physician or both must maintain medical records in accordance with 29 CFR 1910.1020.

Documents For Employees Subject To Medical Removal

The employer must maintain--for at least the duration of employment–an accurate record for each employee subject to medical removal, including:

- The name and social security number of the employee;
- The date on each occasion that the employee was removed from current exposure to lead and the corresponding date which the employee was returned to former job status;
- A brief explanation of how each removal was or is being accomplished; and
- A statement about each removal indicating whether the reason for removal was an elevated blood level.

Employer Requirements Related To Objective Data

The employer must establish and maintain an accurate record documenting the nature and relevancy of objective data relied on to assess initial employee exposure in lieu of exposure monitoring.

The employer must maintain the record of objective data relied on for at least 30 years.

Documents For OSHA and NIOSH Review

The employer must make all records--including exposure monitoring, objective data, medical removal, and medical records--available upon request to affected employees, former employees, and their designated representatives and to the OSHA Assistant Secretary and the Director of the National Institute for Occupational Safety and Health (NIOSH) for examination and copying in accordance with 29 CFR 1910.1020.

When Closing A Business

When an employer ceases to do business, the successor employer must receive and retain all required records. If no successor is available, these records must be sent to the Director of NIOSH.

Exposure Reduction and Employee Protection

The most effective way to protect workers is to minimize their exposure through engineering controls, good work practices and training, and use of personal protective clothing and equipment, including respirators, where required. The employer needs to designate a competent person capable of identifying existing and predictable lead hazards and who is authorized to take prompt corrective measures to eliminate such problems. The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective worker protection program.

These professionals may work independently or may be associated with an insurance carrier, trade organization, or onsite consultation program.

Training can be done on the job or in a controlled environment.
The employer should, as needed, consult a qualified safety and health professional to develop and implement an effective worker protection program.

These professionals may work independently or may be associated with an insurance carrier, trade organization, or onsite consultation program.

Engineering Controls

Engineering measures include local and general exhaust ventilation, process and equipment modification, material substitution, component replacement, and isolation or automation. Examples of recommended engineering controls that can help reduce worker exposure to lead are described as follows.

Exhaust Ventilation

Equip power tools used to remove lead-based paint with dust collection shrouds or other attachments so that paint is exhausted through a high-efficiency particulate air (HEPA) vacuum system. For operations such as welding, cutting/burning, or heating, use local exhaust ventilation. Use HEPA vacuums during cleanup operations.

For abrasive blasting operations, build a containment structure that is designed to optimize the flow of clean ventilation air past the workers' breathing zones. This will help reduce the exposure to airborne lead and increase visibility. Maintain the affected area under negative pressure to reduce the chances that lead dust will contaminate areas outside the enclosure. Equip the containment structure with an adequately sized dust collector to control emissions of particulate matter into the environment.

Enclosure Or Encapsulation

One way to reduce the lead inhalation or ingestion hazard posed by lead-based paint is to encapsulate it with a material that bonds to the surface, such as acrylic or epoxy coating or flexible wall coverings. Another option is to enclose it using systems such as gypsum wallboard, plywood paneling, and aluminum, vinyl, or wood exterior siding. Floors coated with lead-based paint can be covered using vinyl tile or linoleum.

The building owner or other responsible person should oversee the custodial and maintenance staffs and contractors during all activities involving enclosed or encapsulated lead-based paint. This will minimize the potential for an inadvertent lead release during maintenance, renovation, or demolition.

Substitution

Choose materials and chemicals that do not contain lead for construction projects. Among the options are:

- Use zinc-containing primers covered by an epoxy intermediate coat and polyurethane topcoat instead of lead-containing coatings.
- Substitute mobile hydraulic shears for torch cutting under certain circumstances.
- Consider surface preparation equipment such as needle guns with multiple reciprocating needles completely enclosed within an adjustable shroud, instead of abrasive blasting under certain conditions. The shroud captures dust and debris at the cutting edge and can be equipped with a HEPA vacuum filtration with a self-drumming feature. One such commercial unit can remove lead-based paint from flat steel and concrete surfaces, outside edges, inside corners, and pipes.
- Choose chemical strippers in lieu of hand scraping with a heat gun for work on building exteriors, surfaces involving carvings or molding, or intricate iron work. Chemical removal generates less airborne lead dust. (Be aware, however, that these strippers themselves can be hazardous and that the employer must review the material safety data sheets (MSDSs) for these stripping agents to obtain information on their hazards.)

> Using a paint stripper containing methylene chloride
> is a prohibited practice in Wisconsin

Component Replacement

Replace lead-based painted building components such as windows, doors, and trim with new components free of lead-containing paint. Another option is to remove the paint offsite and then repaint the components with zinc-based paint before replacing them.

Process Or Equipment Modification

When applying lead paints or other lead-containing coatings, use a brush or roller rather than a sprayer. This application method introduces little or no paint mist into the air to present a lead inhalation hazard. (Note that there is a ban on the use of lead-based paint in residential housing.)
Use non-silica-containing abrasives such as steel or iron shot/grit sand instead of sand in abrasive blasting operations when practical. The free silica portion of the dust presents a respiratory health hazard.

When appropriate for the conditions, choose blasting techniques that are less dusty than open-air abrasive blasting. These include hydro- or wet-blasting using high-pressure water with or without an abrasive or surrounding the blast nozzle with a ring of water, and vacuum blasting where a vacuum hood for material removal is positioned around the exterior of the blasting nozzle.

When using a heat gun to remove lead-based paints in residential housing units, be sure it is of the flameless electrical softener type. Heat guns should have electronically controlled temperature settings to allow usage below 700 degrees F. Equip heat guns with various nozzles to cover all common applications and to limit the size of the heated work area.

When using abrasive blasting with a vacuum hood on exterior building surfaces, ensure that the configuration of the heads on the blasting nozzle match the configuration of the substrate so that the vacuum is effective in containing debris.

Ensure that HEPA vacuum cleaners have the appropriate attachments for use on unusual surfaces. Proper use of brushes of various sizes, crevice and angular tools, when needed, will enhance the quality of the HEPA-vacuuming process and help reduce the amount of lead dust released into the air.

Lead-Safe Renovation (EPA & DHS) prohibited practices:

- Open-flame burning or torching.
- Heat gun above 1100° F.
- Power sanding, power grinding, power planing, needle guns, abrasive blasting and sandblasting, without shroud or containment system equipped with HEPA vacuum

Isolation

Although it is not feasible to enclose and ventilate some abrasive blasting operations completely, it is possible to isolate many operations to help reduce the potential for lead exposure.

Isolation consists of keeping employees not involved in the blasting operations as far away from the work area as possible, reducing the risk of exposure.

Housekeeping and Personal Hygiene

Lead is a cumulative and persistent toxic substance that poses a serious health risk. A rigorous housekeeping program and the observance of basic personal hygiene practices will minimize employee exposure to lead. In addition, these two elements of the

worker protection program help prevent workers from taking lead contaminated dust out of the worksite and into their homes where it can extend the workers' exposures and potentially affect their families' health.

Housekeeping Practices

An effective housekeeping program involves a regular schedule to remove accumulations of lead dust and lead-containing debris. The schedule should be adapted to exposure conditions at a particular worksite. OSHA's Lead Standard for Construction requires employers to maintain all surfaces as free of lead contamination as practicable. Vacuuming lead dust with HEPA-filtered equipment or wetting the dust with water before sweeping are effective control measures. Compressed air may not be used to remove lead from contaminated surfaces unless a ventilation system is in place to capture the dust generated by the compressed air.

In addition, put all lead-containing debris and contaminated items accumulated for disposal into sealed, impermeable bags or other closed impermeable containers. Label bags and containers as lead-containing waste. These measures provide additional help in controlling exposure.

> Put all lead-containing debris and contaminated items accumulated for disposal into **sealed, impermeable bags or other closed impermeable containers.** Label bags and containers as lead-containing waste.

Personal Hygiene Practices

Emphasize workers' personal hygiene such as washing their hands and face after work and before eating to minimize their exposure to lead. Provide and ensure that workers use washing facilities. Provide clean change areas and readily accessible eating areas. If possible, provide a parking area where cars will not be contaminated with lead. These measures:

- Reduce workers' exposure to lead and the likelihood that they will ingest lead,
- Ensure that the exposure does not extend beyond the worksite,
- Reduce the movement of lead from the worksite, and
- Provide added protection to employees and their families.

Changing Areas

The employer must provide a clean change area for employees whose airborne exposure to lead is above the PEL. The area must be equipped with storage facilities for street clothes and a separate area with facilities for the removal and storage of lead-contaminated protective work clothing and equipment. This separation prevents cross contamination of the employee's street and work clothing.

Employees must use a clean change area for taking off street clothes, suiting up in clean protective work clothing, donning respirators before beginning work, and dressing in street clothes after work. No lead-contaminated items should enter this area.

Work clothing must not be worn away from the jobsite. Under no circumstances should lead-contaminated work clothes be laundered at home or taken from the worksite, except to be laundered professionally or for disposal following applicable federal, state, and local regulations.

Showers And Washing Facilities

When feasible, showers must be provided for use by employees whose airborne exposure to lead is above the permissible exposure limit so they can shower before leaving the worksite. Where showers are provided, employees must change out of their work clothes and shower before changing into their street clothes and leaving the worksite. If employees do not change into clean clothing before leaving the worksite, they may contaminate their homes and automobiles with lead dust, extending their exposure and exposing other members of their household to lead.

In addition, employers must provide adequate washing facilities for their workers. These facilities must be close to the worksite and furnished with water, soap, and clean towels so employees can remove lead contamination from their skin.

Contaminated water from washing facilities and showers must be disposed of in accordance with applicable local, state, or federal regulations.

Personal Practices

The employer must ensure that employees do not enter lunchroom facilities or eating areas with protective work clothing or equipment unless surface lead dust has been removed. HEPA vacuuming and use of a downdraft booth are examples of cleaning methods that limit the dispersion of lead dust from contaminated work clothing.

In all areas where employees are exposed to lead above the PEL, employees must observe the prohibition on the presence and consumption or use of food, beverages, tobacco products, and cosmetics. Employees whose airborne exposure to lead is above the PEL must wash their hands and face before eating, drinking, smoking, or applying cosmetics.

No food, beverages, tobacco products or cosmetics are allowed in areas where employees are exposed to lead above the PEL.
Employees whose airborne exposure to lead is above the PEL must wash their hands and face before eating, drinking, smoking, or applying cosmetics.

End Of Day Procedures

Employers must ensure that workers who are exposed to lead above the permissible exposure limit follow these procedures at the end of their workday:

▪ Place contaminated clothes, including work shoes and personal protective equipment to be cleaned, laundered, or disposed of, in a properly labeled closed container.

▪ Take a shower and wash their hair. Where showers are not provided, employees must wash their hands and face at the end of the work shift.
▪ Change into street clothes in clean change areas.

Protective Clothing and Equipment

Employer Requirements

Employers must provide workers who are exposed to lead above the PEL or for whom the possibility of skin or eye irritation exists with clean, dry protective work clothing and equipment that are appropriate for the hazard. Employers must provide these items at no cost to employees. Appropriate protective work clothing and equipment used on construction sites includes:

▪ Coveralls or other full-body work clothing;
▪ Gloves, hats, and shoes or disposable shoe coverlets;
▪ Vented goggles or face shields with protective spectacles or goggles;
▪ Welding or abrasive blasting helmets; and
▪ Respirators.

Clean work clothing must be issued daily for employees whose exposure levels to lead are above 200 μg/m3, weekly if exposures are above the PEL but at or below 200 μg/m3 or where the possibility of skin or eye irritation exists.

Handling Contaminated Protective Clothing

Workers must not be allowed to leave the worksite wearing lead contaminated protective clothing or equipment. This is an essential step in reducing the movement of lead contamination from the workplace into the worker's home and provides added protection for employees and their families.

Disposable coveralls and separate shoe covers may be used, if appropriate, to avoid the need for laundering. Workers must remove protective clothing in change rooms provided for that purpose.

Employers must ensure that employees leave the respirator use area to wash their faces and respirator face pieces as necessary. In addition, employers may require their employees to use HEPA vacuuming, damp wiping, or another suitable cleaning method before removing a respirator to clear loose particle contamination on the respirator and at the face-mask seal.
Place contaminated clothing that is to be cleaned, laundered, or disposed of by the employer in closed containers. Label containers with the warning: "Caution: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead-contaminated wash water in accordance with applicable local, state, or federal regulations."

Workers responsible for handling contaminated clothing, including those in laundry services or subcontractors, must be informed in writing of the potential health hazard of lead exposure.

At no time shall lead be removed from protective clothing or equipment by brushing, shaking, or blowing. These actions disperse the lead into the work area.

Preventing Heat Stress

Workers wearing protective clothing, particularly in hot environments or within containment structures, can face a risk from heat stress if proper control measures are not used.

Heat stress is caused by several interacting factors, including environmental conditions, type of protective clothing worn; the work activity required and anticipated work rate, and individual employee characteristics such as age, weight, and fitness level.

When heat stress is a concern, the employer should choose lighter, less insulating protective clothing over heavier clothing, as long as it provides adequate protection. Other measures the employer can take include: discussing the possibility of heat stress and its signs and symptoms with all workers; using appropriate work/rest regimens; and providing heat stress monitoring that includes measuring employees' heart rates, body temperatures, and weight loss. Employers must provide a source of water or electrolyte drink in a non-contaminated eating and drinking area close to the work area so workers can drink often throughout the day. Workers must wash their hands and face before drinking any fluid if their airborne exposure is above the PEL.

Workers wearing protective clothing, particularly in hot environments can face a risk from heat stress if proper control measures are not used.

Respiratory Protection

Although engineering and work practice controls are the primary means of protecting workers from exposure to lead, source control at construction sites sometimes is insufficient to control exposure.

In these cases, airborne lead concentrations may be high or may vary widely. Respirators often must be used to supplement engineering controls and work practices to reduce worker lead exposures below the PEL. When respirators are required, employers must provide them at no cost to workers.

The standard requires that respirators be used during periods when an employee's exposure to lead exceeds the PEL, including

- Periods necessary to install or implement engineering or work practice controls, and
- Work operations for which engineering and work practice controls are insufficient to reduce employee exposures to or below the PEL.

Respirators also must be provided upon employee request. A requested respirator is included as a requirement to provide increased protection for those employees who wish to reduce their lead burden below what is required by the standard, particularly if they intend to have children in the near future. In addition, respirators must be used when performing previously indicated high exposure or "trigger" tasks, before completion of the initial assessment.

Providing Adequate Respiratory Protection

Before any employee first starts wearing a respirator in the work environment, the employer must perform a fit test. For all employees wearing negative or positive pressure tight-fitting face piece respirators, the employer must perform either qualitative or quantitative fit tests using an OSHA-accepted fit testing protocol.

In addition, employees must be fit tested whenever a different respirator face piece is used, and at least annually thereafter.

Where daily airborne exposure to lead exceeds 50 μg/m3, affected workers must don respirators before entering the work area and should not remove them until they leave the high exposure area or have completed a decontamination procedure.

Employers must assure that the respirator issued to the employee is selected and fitted properly to ensure minimum leakage through the face piece-to-face seal.

Respiratory Protection Programs

When respirators are required at a worksite, the employer must establish a respiratory protection program in accordance with the OSHA standard on respiratory protection, 29 CFR 1910.134. At a minimum, an acceptable respirator program for lead must include:

- Procedures for selecting respirators appropriate to the hazard;
- Fit testing procedures;
- Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations, including cartridge change schedules;
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- Training of employees in the respiratory hazard to which they are potentially exposed during routine and emergency situations;
- Training of employees in the proper use of respirators, including putting on and removing them, any limitations of their use, and their maintenance;
- Procedures for regularly evaluating the effectiveness of the program;
- Procedures to ensure air quality when supplied air is used;
- A written program and designation of a program administrator; and
- Recordkeeping procedures.

In addition, the construction industry lead standard stipulates medical evaluations of employees required to use respirators.

If an employee has difficulty in breathing during a fit test or while using a respirator, the employer must make a medical examination available to that employee to determine whether he or she can wear a respirator safely.

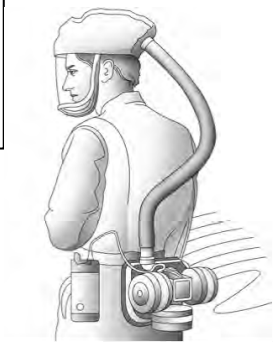
Selecting A Respirator

The employer must select the appropriate respirator from Table 1 of the lead standard, 29 CFR 1926.62(f)(3)(i). The employer must provide a powered air-purifying respirator when an employee chooses to use this respirator and it will provide the employee adequate protection. A NIOSH-certified respirator must be selected and used in compliance with the conditions of its certification. In addition, if exposure monitoring or experience indicates airborne exposures to contaminants other than lead such as silica, solvents, or polyurethane coatings, these exposures must be considered when selecting respiratory protection.

Select type CE respirators approved by NIOSH for abrasive blasting operations. Currently, there are two kinds of CE respirators with the following assigned protection factors (APFs): a continuous flow respirator with a loose-fitting hood, APF 25; and a full face piece supplied-air respirator operated in a positive-pressure mode, APF 2,000. (Note: OSHA recognizes Bullard Helmets, Models 77 and 88 (1995); Clemco Appollo, Models 20 and 60 (1997); and 3M Model 8100 (1998) as having APFs of 1,000.)

For any airline respirator, it is important to follow the manufacturer's instructions regarding air quality, air pressure, and inside diameter and length of hoses. Be aware that using longer hoses or smaller inside diameter hoses than the manufacturer specifies or hoses with bends or kinks may reduce or restrict the airflow to a respirator.

Loose-Fitting Powered Air-Purifying Respirator (PAPR)
APF= 25



Hood Powered Air-Purifying Respirator (PAPR)
APF= 25

Employee Information and Training

The employer must inform employees about lead hazards according to the requirement of OSHA's Hazard Communication standard for the construction industry, 29 CFR 1926.59, including-- but not limited to--the requirements for warning signs and labels, material safety data sheets (MSDSs), and employee information and training. (Refer to 29 CFR 1910.1200.)

Program Requirements

Employers must institute an information and training program and ensure that all employees subject to exposure to lead or lead compounds at or above the action level on any day participate. Also covered under information and training are employees who may suffer skin or eye irritation from lead compounds. Initial training must be provided before the initial job assignment. Training must be repeated at least annually and, in brief summary, must include:

- The content of the OSHA lead standard and its appendices;
- The specific nature of operations that could lead to lead expo-sure above the action level;

- The purpose, proper selection, fit, use, and limitations of respirators;
- The purpose and a description of the medical surveillance program, and the medical removal protection program;
- Information concerning the adverse health effects associated with excessive lead exposure;
- The engineering and work practice controls associated with employees' job assignments;
- The contents of any lead-related compliance plan in effect;
- Instructions to employees that chelating agents must not be used routinely to remove lead from their bodies and when necessary only under medical supervision and at the direction of a licensed physician; and
- The right to access records under "Access to Employee Exposure and Medical Records," 29 CFR 1910.1020.

All materials relating to the training program and a copy of the standard and its appendices must be made readily available to all affected employees.

Warning Signs

Employers are required to post these warning signs in each work area where employee exposure to lead is above the PEL:

- WARNING
- LEAD WORK AREA
- POISON
- NO SMOKING OR EATING

All signs must be well lit and kept clean so that they are easily visible. Statements that contradict or detract from the signs' meaning are prohibited. Signs required by other statutes, regulations, or ordinances, however, may be posted in addition to, or in combination with, this sign.

OSHA Assistance, Services, and Products

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, alliances, and training and education. An overall commitment to workplace safety and health can add value to your business, to your workplace, and to your life.

How does safety and health management system assistance help employers and employees?

Working in a safe and healthful environment can stimulate innovation and creativity and result in increased performance and higher productivity. The key to a safe and healthful work environment is a comprehensive safety and health management system.

OSHA has electronic compliance assistance tools, or eTools, on its website that walks users through the steps required to develop a comprehensive safety and health program. The eTools are posted at www.osha.gov , and are based on guidelines that identify four general elements critical to a successful safety and health management system:

- Management leadership and employee involvement,
- Worksite analysis,
- Hazard prevention and control, and
- Safety and health training

State Programs

The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans and funds up to 50 percent of each program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities that are at least as effective as federal OSHA's. Currently, 26 states and territories have their own plans. Twenty three cover both private and public (state and local government) employees and three states, Connecticut, New Jersey, and New York, cover only the public sector. For more information on state plans, see the list at the end of this publication, or visit OSHA's website at www.osha.gov.

Consultation Assistance

Consultation assistance is available on request to employers who want help establishing and maintaining a safe and healthful workplace. Funded largely by OSHA, the service is provided at no cost to small employers and is delivered by state authorities through professional safety and health consultants.

Safety And Health Achievement Recognition Program

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health management system.
Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for 1 year initially, or 2 years upon renewal. For more information about consultation assistance, see the list of consultation projects at the end of this publication.

Voluntary Protection Programs

Voluntary Protection Programs (VPP) are designed to recognize outstanding achievements by companies that have developed and implemented effective safety and health management programs.

There are three VPP programs: Star, Merit, and Demonstration. All are designed to

- Recognize who that have successfully developed and implemented effective and comprehensive safety and health management programs;
- Encourage these employers to continuously improve their safety and health management programs;
- Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
- Establish a cooperative relationship between employers, employees, and OSHA.

VPP participation can bring many benefits to employers and employees, including fewer worker fatalities, injuries, and illnesses; lost-workday case rates generally 50 percent below industry averages; and lower workers' compensation and other injury- and illness-related costs. In addition, many VPP sites report improved employee motivation to work safely, leading to a better quality of life at work; positive community recognition and interaction; further improvement and revitalization of already-good safety and health programs; and a positive relationship with OSHA.

After a site applies for the program, OSHA reviews an employer's VPP application and conducts a VPP onsite evaluation to verify that the site's safety and health management programs are operating effectively. OSHA conducts onsite evaluations on a regular basis.

Sites participating in VPP are not scheduled for regular, programmed inspections. OSHA does, however, handle any employee complaints, serious accidents, or significant chemical releases that may occur at VPP sites according to routine enforcement procedures.

Additional information on VPP is available from OSHA regional offices listed at the end of this booklet. Also, see "Cooperative Programs" on OSHA's website.

Cooperative Partnerships

OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses. This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management system.

Alliance Programs

Alliances enable organizations committed to workplace safety and health to collaborate with OSHA to prevent injuries and illnesses in the workplace. OSHA and its allies work together to reach out to, educate, and lead the nation's employers and their employees in improving and advancing workplace safety and health.

Alliances are open to all, including trade or professional organizations, businesses, labor organizations, educational institutions, and government agencies. In some cases, organizations may be building on existing relationships with OSHA through other cooperative programs.

There are few formal program requirements for alliances, which are less structured than other cooperative agreements, and the agreements do not include an enforcement component. However, OSHA and the participating organizations must define,

implement, and meet a set of short- and long-term goals that fall into three categories: training and education; outreach and communication; and promotion of the national dialogue on workplace safety and health.

Strategic Partnership Program

OSHA Strategic Partnerships are agreements among labor, management, and government to improve workplace safety and health.

These partnerships encourage, assist, and recognize the efforts of the partners to eliminate serious workplace hazards and achieve a high level of worker safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships build cooperative relationships with groups of employers and employees.

For more information about this program, contact your nearest OSHA office or visit our website.

Occupational Safety and Health Training

The OSHA Training Institute in Arlington Heights, Ill., provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private-sector employers, employees, and their representatives.

Training Grants

OSHA awards grants to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. Grants often focus on high-risk activities or hazards or may help nonprofit organizations in training, education, and outreach.

OSHA expects each grantee to develop a program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training.
Grantees are also expected to follow up with students to find out how they applied the training in their workplaces.

For more information contact OSHA Office of Training and Education, 2020 Arlington Heights Rd., Arlington Heights, IL 60005; or call (847) 297-4810.

Other Assistance Materials

OSHA has a variety of materials and tools on its website at www.osha.gov. These include eTools such as Expert Advisors and Electronic Compliance Assistance Tools, information on specific health and safety topics, regulations, directives, publications, videos, and other information for employers and employees.

OSHA also has an extensive publications program. For a list of items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210.

Telephone (202) 693- 1888 or fax to (202) 693-2498.

In addition, OSHA's CD-ROM includes standards, interpretations, directives, and more. It is available for sale from the U.S. Government Printing Office. To order, write to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or phone (202) 512-1800.

In Case Of An Emergency Or To File A Complaint

To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321-OSHA or contact your nearest OSHA regional office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

Employees can also file a complaint online and get more information on OSHA federal and state programs by visiting OSHA's website at www.osha.gov.

OSHA Regional Offices

*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut, New Jersey, and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

Note: To get contact information for OSHA Area Offices, OSHA-approved state plans, and OSHA Consultation Projects, please visit us online at www.osha.gov or call us at (800) 321-OSHA.

Region I (CT,* ME, MA, NH, RI, VT*) Boston, MA 02203 (617) 565-9860	**Region VI** (AR, LA, NM,* OK, TX) 525 Griffin Street, Room 602 Dallas, TX 75202 (214) 767-4731 or 4736 x224
Region II (NJ,* NY,* PR,* VI*) 201 Varick Street, Room 670 New York, NY 10014 (212) 337-2378	**Region VII** (IA,* KS, MO, NE) City Center Square 1100 Main Street, Suite 800 Kansas City, MO 64105 (816) 426-5861

Region III (DE, DC, MD,* PA,* VA,* WV) The Curtis Center 170 S. Independence Mall West Suite 740 West Philadelphia, PA 19106-3309 (215) 861-4900	**Region VIII** (CO, MT, ND, SD, UT,* WY*) 1999 Broadway, Suite 1690 PO Box 46550 Denver, CO 80202-5716 (303) 844-1600
Region IV (AL, FL, GA, KY,* MS, NC,* SC,* TN*) Atlanta Federal Center 61 Forsyth Street SW, Room 6T50 Atlanta, GA 30303 (404) 562-2300	**Region IX** (American Samoa, AZ,* CA,* HI, NV,* Northern Mariana Islands) 71 Stevenson Street, Room 420 San Francisco, CA 94105 (415) 975-4310
Region V (IL, IN,* MI,* MN,* OH, WI) 230 South Dearborn Street, Room 3244 Chicago, IL 60604 (312) 353-2220	**Region X** (AK,* ID, OR,* WA*) 1111 Third Avenue, Suite 715 Seattle, WA 98101-3212 (206) 553-5930

Blood Lead Laboratories - Wisconsin *(as of 2/17/2012)*

The OSHA Lead Standards for General Industry (29 CFR 1910.1025) and Construction (29 CFR 1926.62) require employers to provide biological monitoring for workers exposed to airborne lead above the action level. Monitoring must be provided for lead and zinc protoporphyrin (or free erythrocyte protoporphyrin) in blood. The employer is required to have these analyses performed by a laboratory that meets accuracy requirements specified by OSHA.

The OSHA List of Laboratories Approved for Blood Lead Analysis is designed to provide a source for regulated employers to locate laboratories that OSHA has determined meet the requirements of the accuracy provisions of the Lead Standards. Laboratories voluntarily provide proficiency test data to OSHA for evaluation.

ACL Industrial Toxicology Laboratory 8901 West Lincoln Avenue P.O. Box 27167A West Allis, WI 53227]	Gundersen Lutheran Laboratory 1910 South Street La Crosse, WI 54601

Bellin Hospital 744 South Webster Avenue Green Bay, WI 54305 920-433-3650, x3067 920-433-5761 Fax: 920-433-5985 e-mail: lablec@bellin.org	Marshfield Med Ctr-St Josephs 1000 North Oak Avenue Marshfield, WI 54449
Consultants Laboratory of Wisconsin 430 East Division Street Fon Du Lac, WI 54935	Milwaukee Health Department 841 North Broadway, Room 205 Milwaukee, WI 53202 414-286-3931 Fax: 414-286-5098 e-mail: bhui@milwaukee.gov
Dean Clinic Laboratory 1313 Fish Hatchery Road Madison, WI 53715 608-252-8021 Fax: 608-283-7376	Wisc State Lab of Hygiene 465 Henry Mall Madison, WI 53706
Dynacare 9200 West Wisconsin Avenue Milwaukee, WI 53226 414-805-8401	

Trenching and Excavations

Working safely in trenches

Each employee in a trench shall be protected from a cave-in by an adequate protective system. Some of the protective systems for trenches are:

- Sloped for stability;
- Cut to create stepped benched grades;
- Supported by a system made with posts, beams, shores or planking and hydraulic jacks;
- Supported by a trench box to protect workers in a trench.
- Additionally, excavated or other materials must be at least 2 feet back from the edge of a trench; and
- A safe means of egress shall be provided within 25 feet of workers in a trench.

OSHA FACT SHEET - Trenching and Excavation Safety

Excavation and trenching are among the most hazardous construction operations. OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. A trench is defined as a narrow underground excavation that is deeper than it is wide, and is no wider than 15 feet (4.5 meters).

Dangers of Trenching and Excavation

Cave-ins pose the greatest risk and are much more likely than other excavation related accidents to result in worker fatalities. Other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment. Trench collapses cause dozens of fatalities and hundreds of injuries each year.

Protect Yourself

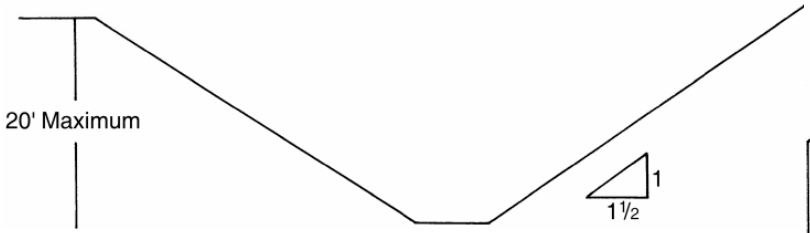
Do not enter an unprotected trench! Trenches 5 feet (1.5 meters) deep or greater require a protective system unless the excavation is made entirely in stable rock. Trenches 20 feet (6.1 meters) deep or greater require that the protective system be designed by a registered professional engineer or be based on tabulated data prepared and/ or approved by a registered professional engineer.

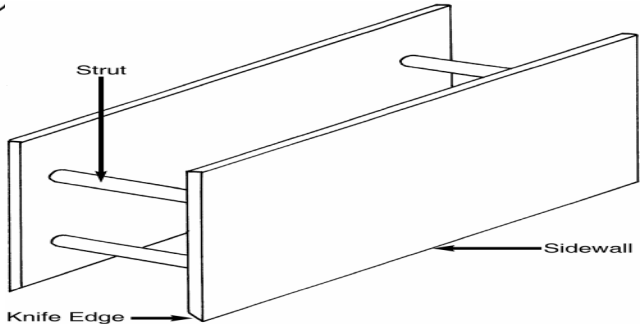
Would you say this worker is protecting himself? Why or why not?

Protective Systems

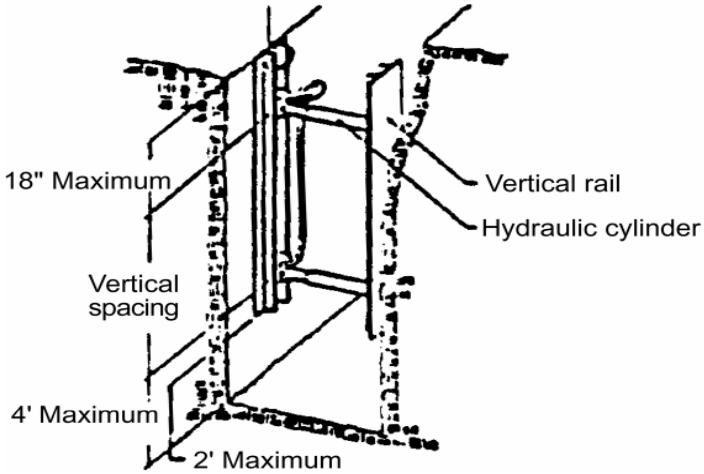
There are different types of protective systems. Sloping involves cutting back the trench wall at an angle inclined away from the excavation. Shoring requires installing aluminum hydraulic or other types of supports to prevent soil movement and caveins. Shielding protects workers by using trench boxes or other types of supports to prevent soil cave-ins. Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes due to weather or climate, surcharge loads (eg., spoil, other materials to be used in the trench) and other operations in the vicinity.

Examples of Sloping, shoring and shielding:

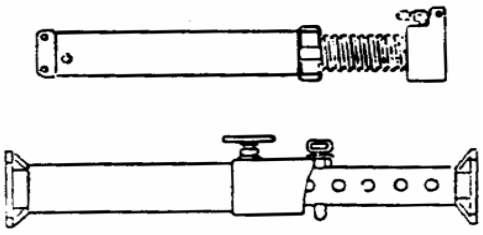




Aluminum hydraulic shoring



Examples of trench jacks used in pneumatic (air) and hydraulic shoring



Competent Person

OSHA standards require that trenches be inspected daily and as conditions change by a competent person prior to worker entry to ensure elimination of excavation hazards. A competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees and who is authorized to take prompt corrective measures to eliminate or control these hazards and conditions.

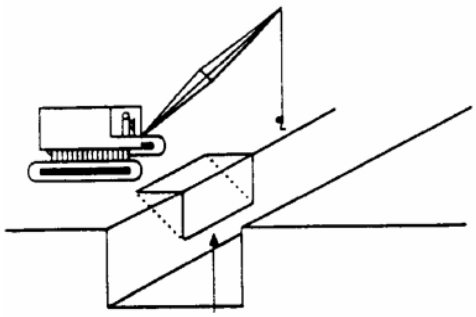
> A competent person needs to inspect a trench daily and as conditions change!

Access and Egress

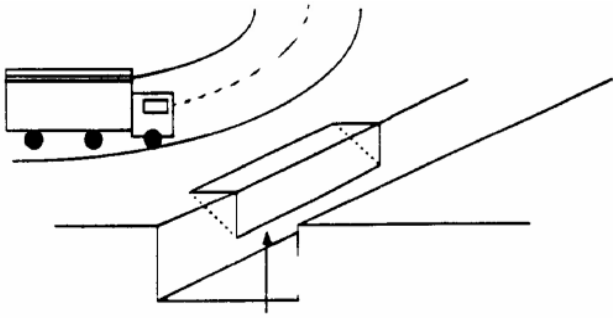
OSHA requires safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located within 25 feet (7.6 meters) of all workers.

General Trenching and Excavation Rules

- Keep heavy equipment away from trench edges.
- Keep surcharge loads at least 2 feet (0.6 meters) from trench edges.
- Know where underground utilities are located.
- Test for low oxygen, hazardous fumes and toxic gases.
- Inspect trenches at the start of each shift.
- Inspect trenches following a rainstorm.
- Do not work under raised loads.



Soil affected by the movement of the crane and susceptible to sliding



Soil affected by the movement of the truck and susceptible to sliding

Additional Information

Visit OSHA's Safety and Health Topics web page on trenching and excavation at http://www.osha.gov/SLTC/trenchingexcavation/index.html

OSHA – EXCAVATIONS

Introduction

Excavation and trenching are among the most hazardous construction operations. The Occupational Safety and Health Administration's (OSHA) Excavation and Trenching standard, Title 29 of the Code of Federal Regulation (CFR), Part 1926.650, covers requirements for excavation and trenching operations. This booklet highlights key elements of the standard, shows ways to protect employees against cave-ins, and describes safe work practices for employees.

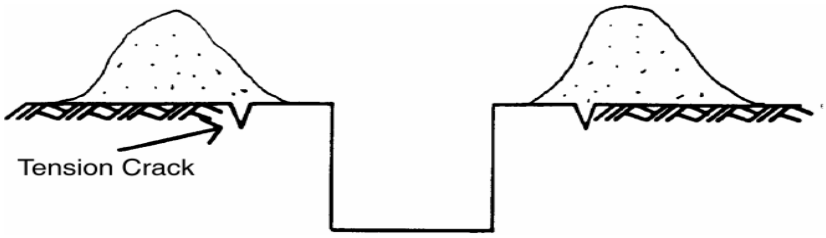
What is the difference between an excavation and a trench?

OSHA defines an excavation as any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. This can include excavations for anything from cellars to highways. A trench is defined as a narrow underground excavation that is deeper than it is wide, and no wider than 15 feet (4.5 meters).

What are the dangers of trenching and excavation operations?

Trenching and excavation work presents serious hazards to all workers involved. Cave-ins pose the greatest risk and are much more likely than other excavation-related accidents to result in worker fatalities. Other potential hazards include falls, falling loads, hazardous atmospheres, and incidents involving mobile equipment.

Heavy loads such as large equipment, heavy materials or large spoil piles
can be too heavy for the soil to support, resulting in cave-ins.
Tension cracks are often the first sign of a possible cave-in.



OSHA's Excavation and Trenching Standard

What does the OSHA standard cover, and what protections does it offer?

The rule applies to all open excavations made in the earth's surface, including trenches. Strict compliance with all sections of the standard will prevent or greatly reduce the risk of cave-ins as well as other excavation-related accidents.

What kinds of excavations and trenches are not covered?

The standard does not apply to house foundation/ basement excavations, including those that become trenches by definition when constructing formwork, foundations, or walls. For this exemption to apply, all the following conditions must exist:

- The excavation is less than 7-1/2 feet (2.5 meters) deep or is benched for at least 2 feet (.61 meters) horizontally for every 5 feet (1.52 meters) or less of vertical height;
- The bottom of the excavation, from the excavation face to the formwork or wall, is at least 2 feet (.61 meters) wide, and wider if possible;
- No water, surface tension cracks, or other environmental conditions reduce the excavation's stability;
- No heavy equipment is vibrating the excavation while employees are in it;
- Soil, equipment, and material surcharge loads are no closer to the top edge of the excavation than the excavation is deep. When you use front-end loaders to dig the excavations, place the soil surcharge load as far back from the edge of the excavation as possible, but never closer than 2 feet (.61 meters);
- The fewest crew members possible are performing the work; and
- Workers spend the minimum time possible in the excavation

This exemption does not apply to utility excavations or trenches, which are covered by 29 CFR 1926.652.

Preplanning

Why is it important to preplan the excavation work?

No matter how many trenching, shoring, and backfilling jobs you have done in the past, it is important to approach each new job with the utmost care and preparation. Many on-the-job accidents result directly from inadequate initial planning. Waiting until after the work has started to correct mistakes in shoring or sloping slows down the operation, adds to the cost, and increases the possibility of a cave-in or other excavation failure.

What safety factors should you consider when bidding on a job?

Before preparing a bid, you will want to know as much as possible about the jobsite and the materials you will need to have on hand to perform the work safely and in compliance with OSHA standards. A safety checklist may prove helpful when you consider specific site conditions such as the following:

- Traffic,
- Proximity and physical conditions of nearby structures,
- Soil,
- Surface and ground water,
- Location of the water table,
- Overhead and underground utilities, and
- Weather.

You can determine these and other conditions through jobsite studies, observations, test borings for soil type or conditions, and consultations with local officials and utility companies. This information will help you determine the amount, kind, and cost of safety equipment you will need to perform the work in the safest manner possible.

How can you avoid hitting underground utility lines and pipes during excavation work?

Before starting work, the OSHA standard requires you to do the following:

- Determine the approximate location of utility installations–sewer, telephone, fuel, electric, and water lines; or any other underground installations;
- Contact the utility companies or owners involved to inform them of the proposed work within established or customary local response times; and
- Ask the utility companies or owners to find the exact location of underground installations. If they cannot respond within 24 hours (unless the period required by state or local law is longer) or cannot find the exact location of the utility installations, you may proceed with caution.

If your excavation work exposes underground installations, OSHA regulations require you to protect, properly support, or remove them.

What should you tell workers before they start the project?

When you share the details of your safety and health program with employees, it is important to emphasize the critical role you expect them to play in keeping the jobsite safe. You may want to emphasize specific rules to help reduce the risk of on-the-job injuries. These rules may include requirements that workers

- Remove or minimize all surface obstacles at the worksite that may create a hazard,
- Wear warning vests or other reflective or high-visibility garments that you provide when they are exposed to vehicular traffic,
- Wear or use prescribed protective gear and equipment correctly,
- Operate equipment only if they have been trained properly in its use and alerted to its potential hazards, and
- Follow safe work practices.

It also is important to establish and maintain a safety and health management system for the worksite that provides adequate systematic policies, procedures, and practices to protect employees from, and allow them to recognize, job-related safety and health hazards.

Protective Systems

How can you prevent cave-ins?

OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by

- Sloping or benching the sides of the excavation,
- Supporting the sides of the excavation, or
- Placing a shield between the side of the excavation and the work area.

How do you choose the most appropriate protective system design?

Designing a protective system can be complex because you must consider many factors: soil classification, depth of cut, water content of soil, changes due to weather and climate, or other operations in the vicinity. You are free to choose the most practical design approach for any particular circumstance.

Once you have selected an approach, however, the system must meet the required performance criteria.
The OSHA standard describes methods and approaches for designing protective systems such as the following:

Method 1 - Slope the sides to an angle not steeper than 1-1/2:1; for example, for every foot of depth, the trench must be excavated back 1-1/2 feet. All simple slope excavations 20 feet (6.11 meters) or less deep should have a maximum allowable slope of 1-1/2:1. These slopes must be excavated to form configurations similar to those for Type C soil, as described in Appendix B of the standard. A slope of this gradation or less is safe for any type of soil.

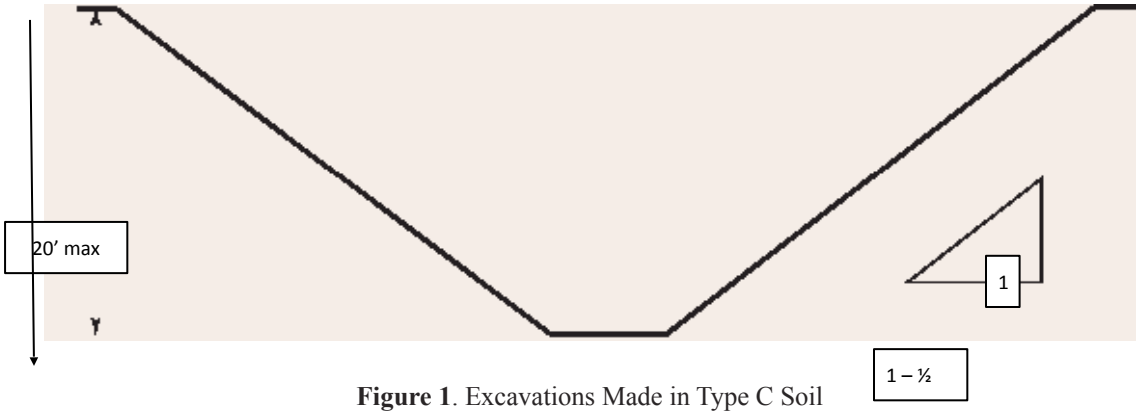


Figure 1. Excavations Made in Type C Soil

Method 2 - Use tabulated data such as tables and charts approved by a registered professional engineer to design the excavation. These data must be in writing and must include enough explanatory information, including the criteria for making a selection and the limits on the use of the data, for the user to make a selection. At least one copy of the data, including the identity of the registered professional engineer who approved it, must be kept at the worksite during construction of the protective system. After the system is completed, the data may be stored away from the jobsite, but a copy must be provided upon request to the Assistant Secretary of Labor for OSHA.

Method 3 - Use a trench box or shield designed or approved by a registered professional engineer or based on tabulated data prepared or approved by a registered professional engineer. Timber, aluminum, or other suitable materials may also be used. OSHA standards permit the use of a trench shield (also known as a welder's hut) if it provides the same level of protection or more than the appropriate shoring system.

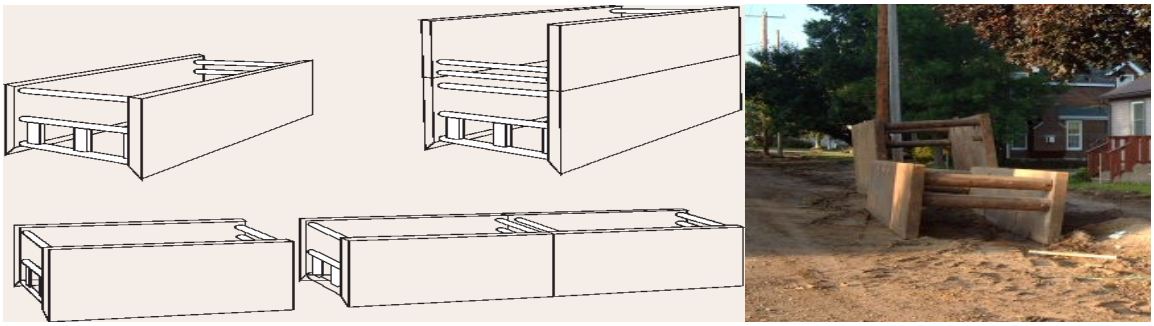


Figure 2. Trench Shields

Employers can choose the most practical method for the particular circumstance, but that system must meet the required performance criteria. The standard does not require a protective system when an excavation is made entirely in stable rock or is less than 5 feet (1.52 meters) deep, if a competent person has examined the ground and found no indication of a potential cave-in.

What other safety precautions are you required to take?

The standard requires you to provide support systems such as shoring, bracing, or underpinning to ensure that adjacent structures such as buildings, walls, sidewalks, or pavements remain stable. The standard also prohibits excavation below the base or footing of any foundation or retaining wall unless

- You provide a support system such as underpinning,
- The excavation is in stable rock, or
- A registered professional engineer determines that the structure is far enough away from the excavation and that excavation will not pose a hazard to employees.

Excavations under sidewalks and pavements are prohibited unless you provide an appropriately designed support system or another effective means of support.

The remains of this house are a safety hazard for workers. The debris is too close to the excavation and there is no protective barricade.
Is there anything else missing?

- Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs to alert operators to the edge of an excavation. If possible, keep the grade away from the excavation.

- Provide scaling to remove loose rock or soil, or install protective barricades and other equivalent protection to protect employees against falling rock, soil, or materials.

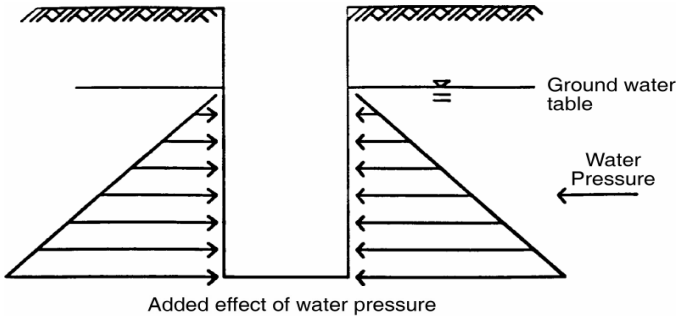
- Prohibit employees from working on faces of sloped or benched excavations at levels above other employees unless you provide the employees at the lower levels adequate protection from the hazard of falling, rolling, or sliding material or equipment.

• Prohibit employees from standing or working under loads being handled by lifting or digging equipment. Require workers to stand away from vehicles being loaded or unloaded to protect them from being struck by any spillage or falling materials. You may permit operators to remain inside cabs of vehicles if they provide adequate protection from falling loads during loading and unloading operations.

These employees are standing or working too close to the digging equipment.

What is the effect of water accumulation on excavation safety?

Among the additional hazards stemming from water in an excavation are undermining the sides and making it more difficult to get out of the excavation. The OSHA standard prohibits employees from working without adequate protection in excavations where water has accumulated or is accumulating. If you use water removal equipment to control or prevent water accumulation, you must ensure that a competent person monitors the equipment and its operation to ensure proper use. OSHA standards also require the use of diversion ditches, dikes, or other suitable means to prevent surface water from entering an excavation and to provide adequate drainage of the adjacent area. In addition, a competent person must inspect excavations subject to runoffs from heavy rains.



Regardless of the soil type, as the depth of the trench increases, the magnitude of pressures on the full height of the excavation also increases. The presence of ground water adds hydrostatic pressure against the walls of the trench.

How can you protect workers against hazardous atmospheres inside excavations?

A competent person must test any excavation deeper than 4 feet (1.22 meters) or where an oxygen deficiency or a hazardous atmosphere is present or could reasonably be expected, such as a landfill or where hazardous substances are stored nearby, before an employee enters it. If there are any hazardous conditions, you must provide the employee controls such as proper respiratory protection or ventilation. In addition, you are responsible for regularly testing all controls used to reduce atmospheric contaminants to acceptable levels.

If unhealthful atmospheric conditions exist or develop in an excavation, you must provide emergency rescue equipment such as a breathing apparatus, safety harness and line, and basket stretcher and ensure that it is readily available. This equipment must be attended when in use.

What means of access and egress are you required to provide?

OSHA requires you to provide safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located in the excavation within 25 feet (7.62 meters) of all workers.

Any structural ramps you use in your operation must be designed by a competent person if they are used for employee access or egress, or by a competent person qualified in structural design if they are used for vehicles. Also, structural members used for ramps or runways must be uniform in thickness and joined in a manner to prevent tripping or displacement.

A safe means of egress shall be provided within 25 feet of workers in a trench.

What protective equipment are employees in pier holes and confined footing excavations required to use?

An employee who enters a bell-bottom pier hole or similar deep and confined footing excavation must wear a harness with a lifeline. The lifeline must be attached securely to the harness and must be separate from any line used to handle materials. Also, while the employee wearing the lifeline is in the excavation, an observer must be on hand to ensure that the lifeline is working properly and maintain communication with the employee.

Which one of these workers is wearing his harness correctly?

The one on left … or the one on the right?

When should you conduct a site inspection?

The standard requires that a competent person inspect an excavation and the areas around it daily for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, or other hazardous conditions. Inspections also are required after natural events such as heavy rains or manmade events such as blasting that may increase the potential for hazards. If the inspector finds any unsafe conditions during an inspection, you must clear employees from the hazardous area until you take safety precautions.

The standard also requires that a competent person inspect excavations and the adjacent areas daily for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, and other hazardous conditions. If the competent person finds these conditions, all exposed employees must leave the hazardous area until necessary safety precautions are taken.

Larger and more complex operations should have a full-time safety official who makes recommendations to improve implementation of the safety plan. In a smaller operation, the safety official may be part-time and usually will be a supervisor.

Supervisors are the contractor's representatives on the job. Supervisors should conduct inspections, investigate accidents, and anticipate hazards. They should ensure that employees receive on-the-job safety and health training. They also should review and strengthen overall safety and health precautions to guard against potential hazards, get the necessary worker cooperation in safety matters, and make frequent reports to the contractor.

OSHA Assistance, Services, and Programs

How can OSHA help me?

OSHA can provide extensive help through a variety of programs, including assistance about safety and health programs, state plans, workplace consultations, Voluntary Protection Programs, strategic partnerships, training and education, and more.

How does safety and health program management help employers and employees?

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. In fact, an effective safety and health management system forms the basis of good worker protection and can save time and money–about $4 for every dollar spent–and increase productivity.

To assist employers and employees in developing effective safety and health programs, OSHA published recommended Safety and Health Program Management Guidelines (Federal Register 54(18):3904–3916, January 26, 1989).

These voluntary guidelines can be applied to all worksites covered by OSHA.

The guidelines identify four general elements critical to the development of a successful safety and health management program:

- Management leadership and employee participation,
- Worksite analysis,
- Hazard prevention and control, and
- Safety and health training.

The guidelines recommend specific actions under each of these general elements to achieve an effective safety and health program. The Federal Register notice is available online at www.osha.gov

What are state plans?

State plans are OSHA-approved job safety and health programs operated by individual states or territories instead of Federal OSHA. The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans and permits state enforcement of OSHA standards if the state has an approved plan. Once OSHA approves a state plan, it funds 50 percent of the program's operating costs. State plans must provide standards and enforcement programs, as well as voluntary compliance activities that are at least as effective as those of Federal OSHA.

There are 26 state plans: 23 cover both private and public (state and local government) employment, and 3 (Connecticut, New Jersey, and New York) cover only the public sector. For more information on state plans, see the listing at the end of this publication, or visit OSHA's website at www.osha.gov

How can consultation assistance help employers?

In addition to helping employers identify and correct specific hazards, OSHA's consultation service provides free, onsite assistance in developing and implementing effective workplace safety and health management systems that emphasize the prevention of worker injuries and illnesses.

Comprehensive consultation assistance provided by OSHA includes a hazard survey of the worksite and an appraisal of all aspects of the employer's existing safety and health management system. In addition, the service offers assistance to employers in developing and implementing an effective safety and health management system. Employers also may receive training and education services, as well as limited assistance away from the worksite.

Who can get consultation assistance and what does it cost?

Consultation assistance is available to small employers (with fewer than 250 employees at a fixed site and no more than 500 corporatewide) who want help in establishing and maintaining a safe and healthful workplace.

Funded largely by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state governments employing professional safety and health consultants. No penalties are proposed or citations issued for hazards identified by the consultant. The employer's only obligation is to correct all identified serious hazards within the agreed-upon correction time frame.

Can OSHA assure privacy to an employer who asks for consultation assistance?

OSHA provides consultation assistance to the employer with the assurance that his or her name and firm and any information about the workplace will not be routinely reported to OSHA enforcement staff.

Can an employer be cited for violations after receiving consultation assistance?

If an employer fails to eliminate or control a serious hazard within the agreed-upon time frame, the consultation project manager must refer the situation to the OSHA enforcement office for appropriate action. This is a rare occurrence, however, since employers request the service for the expressed purpose of identifying and fixing hazards in their workplaces.

Does OSHA provide any incentives for seeking consultation assistance?

Yes. Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation in SHARP includes, but is not limited to, receiving a full-service, comprehensive consultation visit, correcting all identified hazards, and developing an effective safety and health management system.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for a period of 1 year initially, or 2 years upon renewal. For more information concerning consultation assistance, see the list of consultation offices or contact your regional or area OSHA office, or visit OSHA's website at www.osha.gov .

What are the Voluntary Protection Programs?

Voluntary Protection Programs (VPPs) represent one part of OSHA's effort to extend worker protection beyond the minimum required by OSHA standards. VPP - along with onsite consultation services, full-service area offices, and OSHA's Strategic Partnership Program (OSPP) - represents a cooperative approach which, when coupled with an effective enforcement program, expands worker protection to help meet the goals of the OSH Act.

How do the VPP work?

There are three levels of VPPs: Star, Merit, and Demonstration. All are designed to do the following:

- Recognize employers who have successfully developed and implemented effective and comprehensive safety and health management systems;
- Encourage these employers to continuously improve their safety and health management systems;
- Motivate other employers to achieve excellent safety and health results in the same outstanding way; and
- Establish a relationship between employers, employees, and OSHA that is based on cooperation.

How do VPP help employers and employees?

VPP participation can mean the following:

- Fewer worker fatalities, injuries, and illnesses;
- Lost-workday case rates generally 50 percent below industry averages;
- Lower workers' compensation and other injury- and illness-related costs;
- Improved employee motivation to work safely, leading to a better quality of life at work;
- Positive community recognition and interaction;
- Further improvement and revitalization of already-good safety and health programs; and a
- Positive relationship with OSHA.

How does OSHA monitor VPP sites?

OSHA reviews an employer's VPP application and conducts a VPP Onsite Evaluation to verify that the safety and health management systems described are operating effectively at the site. OSHA conducts onsite evaluations on a regular basis, annually for participants at the Demonstration level, every 18 months for Merit, and every 3 to 5 years for Star. Each February, all participants must send a copy of their most recent annual evaluation to their OSHA regional office. This evaluation must include the worksite's record of injuries and illnesses for the past year.

Can OSHA inspect an employer who is participating in the VPP?

Sites participating in VPP are not scheduled for regular, programmed inspections. OSHA handles any employee complaints, serious accidents, or significant chemical releases that may occur at VPP sites according to routine enforcement procedures.

Additional information on VPP is available from OSHA national, regional, and area offices. Also, see Outreach on OSHA's website at www.osha.gov.

How can a partnership with OSHA improve worker safety and health?

OSHA has learned firsthand that voluntary, cooperative partnerships with employers, employees, and unions can be a useful alternative to traditional enforcement and an effective way to reduce worker deaths, injuries, and illnesses.

This is especially true when a partnership leads to the development and implementation of a comprehensive workplace safety and health management system.

What is OSHA Strategic Partnership Program (OSPP)?

OSHA Strategic Partnerships are alliances among labor, management, and government to foster improvements in workplace safety and health. These partnerships are voluntary, cooperative relationships between OSHA, employers, employee representatives, and others such as trade unions, trade and professional associations, universities, and other government agencies. OSPPs are the newest of OSHA's cooperative programs.

What do OSPPs do?

These partnerships encourage, assist, and recognize the efforts of the partners to eliminate serious workplace hazards and achieve a high level of worker safety and health.

Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships seek to have a broader impact by building cooperative relationships with groups of employers and employees.

What are the different kinds of OSPPs?

There are two major types:

- Comprehensive, which focus on establishing comprehensive safety and health management systems at partnering worksites; and
- Limited, which help identify and eliminate hazards associated with worker deaths, injuries, and illnesses, or have goals other than establishing comprehensive worksite safety and health programs.

OSHA is interested in creating new OSPPs at the national, regional, and local levels. OSHA also has found limited partnerships to be valuable. Limited partnerships might address the elimination or control of a specific industry hazard.

What are the benefits of participation in the OSPP?

Like VPP, OSPP can mean the following:

- Fewer worker fatalities, injuries, and illnesses;
- Lower workers' compensation and other injury- and illness-related costs;
- Improved employee motivation to work safely, leading to a better quality of life at work and enhanced productivity;
- Positive community recognition and interaction;
- Development of or improvement in safety and health management systems; and
- Positive interaction with OSHA.

For more information about this program, contact your nearest OSHA office or go to the agency website at www.osha.gov .

Does OSHA have occupational safety and health training for employers and employees?

The OSHA Training Institute in Des Plaines, IL, provides basic and advanced training and education in safety and health for federal and state compliance officers, state consultants, other federal agency personnel, and private sector employers, employees, and their representatives.

Institute courses cover diverse safety and health topics including electrical hazards, machine guarding, personal protective equipment, ventilation, and ergonomics. The facility includes classrooms, laboratories, a library, and an audiovisual unit. The laboratories contain various demonstrations and equipment, such as power presses, woodworking and welding shops, a complete industrial ventilation unit, and a sound demonstration laboratory.

More than 57 courses dealing with subjects such as safety and health in the construction industry and methods of compliance with OSHA standards are available for personnel in the private sector.

In addition, OSHA's 73 area offices are full-service centers offering a variety of informational services such as personnel for speaking engagements, publications, audiovisual aids on workplace hazards, and technical advice.

For more information on grants, training, and education, write: OSHA Training Institute, Office of Training and Education, 1555 Times Drive, Des Plaines, IL 60018; call (847) 297–4810; or see Outreach on OSHA's website at www.osha.gov .

Does OSHA give money to organizations for training and education?

OSHA awards grants through its Susan Harwood Training Grant Program to nonprofit organizations to provide safety and health training and education to employers and workers in the workplace. The grants focus on programs that will educate workers and employers in small business (fewer than 250 employees), training workers and employers about new OSHA standards or about high-risk activities or hazards. Grants are awarded for 1 year and may be renewed for an additional 12 months depending on whether the grantee has performed satisfactorily.

OSHA expects each organization awarded a grant to develop a training and/or education program that addresses a safety and health topic named by OSHA, recruit workers and employers for the training, and conduct the training.

Grantees are also expected to follow up with people who have been trained to find out what changes were made to reduce the hazards in their workplaces as a result of the training.

Each year OSHA has a national competition that is announced in the Federal Register and on the Internet at www.osha-slc.gov/Training/sharwood/sharwood.html .

If you do not have access to the Internet, you can contact the OSHA Office of Training and Education, 1555 Times Drive, Des Plaines, IL 60018, (847) 297–4810, for more information.

Does OSHA have other assistance materials available?

OSHA has a variety of materials and tools available on its website at www.osha.gov . These include eTools, Expert Advisors, Electronic Compliance Assistance Tools (e-CATs), Technical Links, regulations, directives, publications, videos, and other information for employers and employees. OSHA's software programs and compliance assistance tools walk you through challenging safety and health issues and common problems to find the best solutions for your workplace. OSHA's comprehensive publications program includes more than 100 titles to help you understand OSHA requirements and programs.

OSHA's CD-ROM includes standards, interpretations, directives, and more and can be purchased on CD-ROM from the U.S. Government Printing Office. To order, write to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402, or phone (202) 512–1800.

Specify OSHA Regulations, Documents and Technical Information on CD-ROM (ORDT), GPO Order No. S/N 729-013-00000-5.

What do I do in case of an emergency or if I need to file a complaint?

To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321–OSHA or contact your nearest OSHA regional or area office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889–5627.

You can also file a complaint online and obtain more information on OSHA federal and state programs by visiting OSHA's website at www.osha.gov .

OSHA Regional and Area Offices

OSHA Regional Offices

*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut, New Jersey and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

Region I (CT,* ME, MA, NH, RI, VT*) JFK Federal Building, Room E340 Boston, MA 02203 (617) 565–9860	**Region VI** (AR, LA, NM,* OK, TX) 525 Griffin Street, Room 602 Dallas, TX 75202 (214) 767–4731 or 4736 x224
Region II (NJ,* NY,* PR,* VI*) 201 Varick Street, Room 670 New York, NY 10014 (212) 337–2378	**Region VII** (IA,* KS, MO, NE) City Center Square 1100 Main Street, Suite 800 Kansas City, MO 64105 (816) 426–5861

Region III (DE, DC, MD,* PA,* VA,* WV) The Curtis Center 170 S. Independence Mall West Suite 740 West Philadelphia, PA 19106-3309 (215) 861–4900	**Region VIII** (CO, MT, ND, SD, UT,* WY*) 1999 Broadway, Suite 1690 PO Box 46550 Denver, CO 80202-5716 (303) 844–1600
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