

graded that the entire system or parts thereof can be controlled and drained. The formation of traps or sags in water piping shall be avoided where possible. When unavoidable such sags, traps or inverts shall have provisions for properly draining same.

(d) *Valve controls.* Controls within a building shall include a valve or compression stop for each lawn sprinkler, hot water tank, water closet, urinal and point of entrance of the water service. In a multiple dwelling or public building a valve shall also be provided at the base of each riser and for each dwelling unit or public toilet room unless served by an independent riser, and for each branch serving fixtures in the basement.

(e) *Water supply to fixtures.* All plumbing fixtures shall be provided with a sufficient supply of water for flushing to keep them in a sanitary condition. Every water closet shall be flushed by means of an approved tank or flush valve, of at least 4-gallon flushing capacity and at least one gallon for each urinal. The water from flush tanks shall be used for no other purpose than to reseal drain traps. See subsections H 62.12 (8), (9).

(f) *Water hammer suppressors.* 1. Water hammer suppressors. All water supply systems, water distribution systems and components connected thereto, shall be provided with approved shock absorbing devices, located and sized to suppress water hammer.

2. Air chamber. Water supply risers of three or more floors shall terminate with an air chamber. Water supply pipes serving fixtures, appliances, equipment, devices and appurtenances shall terminate with an air chamber. For three-eighth and one-half inch inside diameter pipe the air chamber shall be $\frac{1}{2}$ inch x 1 inch x 14 inches. For three-quarter inch inside diameter pipe the air chamber shall be $\frac{1}{2}$ inch x $1\frac{1}{2}$ inches x 18 inches. For pipe sizes greater than three-quarter inch inside diameter the volume, length and diameter of the air chamber shall be in accord with the hydraulic design of the piping system served and the connection shall be one nominal inside diameter smaller than the pipe served. Excessively high air chambers should not be used. For the purpose of this rule, the length of an air chamber will be determined by measuring from the bottom of the restriction to the top of the air chamber with the length of the restricted portion no greater than $1\frac{1}{2}$ inches.

3. Mechanical suppressor. Approved mechanical water hammer suppressors may be installed in lieu of air chambers. The size and location of the suppressor shall be in accord with the hydraulic design of the piping system served. All mechanical water hammer suppressors shall be accessible.

(g) *Relief valves.* Relief valves shall be provided on all domestic hot water boilers or storage tanks of the closed type. No valve of any type shall be placed between the relief valve and a hot water boiler. The relief valve shall be installed at or within 18 inches of a boiler or hot water tank. The discharge pipe from the relief valve shall terminate in an open fixture or not more than 10 inches from the floor as close as possible to a drain properly connected to the house drain or house sewer. No thread shall be permitted at the end of such discharge pipe. The valve shall be an effective relief valve with non-corrosive seat and be of the diaphragm or bellows type which has been certified by a recognized testing labo-

ratory or approved by the board. Relief valves should be provided on all private water systems using displacement type pumping equipment.

(h) *Protection against frost.* All water pipe, storage tanks and flushing tanks subject to low temperatures shall be effectively protected against freezing.

(3) **SPECIAL EQUIPMENT.** (a) *Separate piping for each source.* A water supply that meets accepted standards of purity for human consumption shall be distributed through a piping system entirely independent of any piping system conveying another water supply.

(b) *Piping by plumber.* In municipalities having public water supply and sewerage systems or in any area platted under ch. 236 adjacent to such municipalities and in metropolitan sewerage districts, no person not licensed by the board as a master plumber or as a journeyman plumber shall install any piping for water supply to any system designed for steam power, heating, temperature regulation, automatic fire protection, hydraulic power, or for any special water usage for industrial or manufacturing purposes. All such piping for supplying water for any system for steam power, heating, temperature regulations, automatic fire protection, hydraulic power, or for any special water usage for industrial or manufacturing purposes, shall be installed by the licensed plumber to the appliance forming the unit or initial point of such system and shall terminate with a valve, located at the unit or appliance to be connected.

(c) *Piping by equipment installer.* The connection of appliances forming the initial unit of such systems, to the water supply pipe installed by the licensed plumber, as prescribed by rules and regulations, may be made by the person installing such aforesaid systems, but the connection of the water supply shall be made in a manner to prevent the possibility of contamination of the water supply by the backflow of water from such systems by siphonage, drainage, or force.

(4) **PRIVATE SYSTEMS.** (a) *Source.* All private water supplies shall be uncontaminated and the source shall conform in construction with the specifications of the Wisconsin well construction and pump installation code. All supplies known to be subject to occasional pollution shall be either discontinued or made safe as directed by the board.

(b) *Capacity.* All private water supply systems, pumps, and water pressure storage tanks serving residences or public school and similar buildings shall be of sufficient capacity and size, and shall have sufficient pressure and volume of water to provide adequate flushing facilities in order to maintain the plumbing fixtures and appliances in a sanitary and good operating condition at all times.

Note: For detailed information and specific rules and regulations governing the location, construction of wells, setting of pumps, sealing of well top, see the Wisconsin well construction and pump installation code adopted by the board pursuant to ch. 162, Wis. Stats.

History: 1-2-56; r. and rec. (2) (f), Register, October, 1968, No. 154, eff. 11-1-68.

H 62.19 Back siphonage and cross connections. (1) **PROHIBITED FIXTURE INSTALLATIONS.** No closet bowl or other fixture equipped with

Register, October, 1968, No. 154

a flushometer valve shall be installed with a side or rear spud located below the lower part of the flush rim of the bowl.

(2) **PROHIBITED COMBINATION FAUCET USE.** No faucet or combination faucet or like appliance so installed as to form a cross connection directly or indirectly between a safe drinking water and an unsafe or questionable water supply shall be permitted.

(3) **PROHIBITED WATER—DRAINAGE SYSTEM INTERCONNECTION.** No direct plumbing fixture or pipe connection shall be made between any part of the water supply system and any part of the plumbing drainage system or impure water supply system unless adequately protected against back-siphonage.

(4) **PROTECTION FROM BACK-SIPHONAGE.** (a) *Fixture inlets.* All fixture water supply inlets of every description shall be located and designed so as to prevent the possibility of back-siphonage or back-drainage of any of the fixture contents into the water supply lines.

(b) *Inlet elevation.* Whenever possible the water supply inlet shall terminate at least two pipe diameters but not less than one inch above the maximum possible water level of the fixture, tank or vat so as to prevent the possibility of back-siphonage.

APPENDIX "C"

TABLE C-7*

RECOMMENDED SIZES OF AIR CHAMBERS FOR REDUCING
WATER-HAMMER PRESSURES

Air Chamber Sizes in Cubic Inches

Length of Pipe	Nominal Pipe Diameter								
	1"			1½"			2"		
	Water Velocity in Feet Per Second								
	5	10	15	5	10	15	5	10	15
	For Flow Pressure of 15 lbs. per Sq. Inch								
25	4	13	28	7	28	64	13	50	113
50	7	25	56	14	56	127	25	100	225
100	13	50	112	28	112	253	50	200	450
200	25	100	225	56	225	506	100	400	900
500	62	250	560	140	562	1,260	250	1,000	2,250
	For Flow Pressure of 30 lbs. per Sq. Inch								
25	5	20	45	12	45	100	20	80	180
50	10	40	90	24	90	202	40	160	360
100	20	80	180	45	180	405	80	329	720
200	40	160	360	90	360	810	160	640	1,440
500	100	400	900	225	900	2,025	400	1,600	3,600
	For Flow Pressure of 60 lbs. per Sq. Inch								
25	10	38	85	22	85	190	38	150	340
50	19	75	170	42	170	380	75	300	675
100	38	150	338	85	340	760	150	600	1,350
200	75	300	665	170	675	1,520	300	1,200	2,700
500	188	750	1,640	420	1,690	3,800	750	3,000	6,700

*From Water-Supply Piping for the Plumbing System by F. W. Dawson and A. A. Kalinske, Iowa Institute of Hydraulic Research, Iowa City, Iowa. 1942.