

DEPARTMENT OF ENERGY, LABOR, AND ECONOMIC GROWTH

DIRECTOR'S OFFICE

CONSTRUCTION CODE

(By authority conferred on the director of the department of energy, labor, and economic growth by section 4 of 1972 PA 230, MCL 125.1504, and Executive Reorganization Order Nos. 2003-1 and 2008-20, MCL 445.2011 and MCL 445.2025)

PART 7. PLUMBING CODE

R 408.30701 Applicable code.

Rule 701. Rules governing the installation, replacement, alteration, relocation, and use of plumbing systems or plumbing materials shall be those contained in the international plumbing code, 2009 edition, including appendices B, C, D, F, and G, except for sections 102.10, 102.11, 103.4, 106.6.1, 106.6.2, 106.6.3, 107.2.5, 107.2.5.1, 107.2.5.2, 107.2.5.3, 109.2 to 109.7, 312.1.1, 602.3 to 602.3.5.1, 604.11, 608.17 to 608.17.8, 708.3.2, 708.3.6, 1106.6, and tables 1106.2(2) and 1106.6. With the exceptions noted, the code is adopted in these rules by reference. All references to the International Building Code, International Residential Code, International Energy Conservation Code, International Electrical Code, International Mechanical Code, and International Plumbing Code mean the Michigan Building Code, Michigan Residential Code, Michigan Uniform Energy Code, Michigan Electrical Code, Michigan Mechanical Code, and Michigan Plumbing Code respectively. The code is available for inspection at the Okemos office of the Michigan department of energy, labor, and economic growth, bureau of construction codes. The code may be purchased from the International Code Council, 500 New Jersey Avenue, N.W., 6th Floor, Washington, D.C. 20001, or from the Michigan Department of Energy, Labor, and Economic Growth, Bureau of Construction Codes, 2501 Woodlake Circle, Okemos, Michigan 48864, at a cost as of the time of adoption of these rules of \$62.00 each.

History: 1979 AC; 1980 AACS; 1982 AACS; 1985 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS; 2010 AACS.

R 408.30709 Rescission.

Rule 709. Rules 1 to 141 of the rules of the state plumbing board, being R 338.901 to R 338.914 of the Michigan Administrative Code and appearing on pages 3801 to 3818 of the 1954 volume of the Code, are rescinded.

History: 1979 AC.

AMENDMENTS AND ADDITIONS TO BASIC PLUMBING CODE

R 408.30711 Title and scope.

Rule 711. Sections 101.1 and 101.2 of the code are amended to read as follows:

101.1. Title. This part shall be known as the Michigan plumbing code and is hereinafter referred to as "the plumbing code" or "the code." This part shall control all matters concerning the installation, replacement, alteration, relocation, and use of plumbing systems or plumbing materials as herein defined and shall apply to existing or proposed buildings and structures in the state.

101.2. Scope. The design and installation of plumbing systems, including sanitary and storm drainage, sanitary facilities, medical gas systems, water supplies, and storm water and sewage disposal in buildings, shall comply with the requirements of the code. The design and installation of gas piping, chilled water piping in connection with refrigeration process and comfort cooling, and hot water piping in connection with building heating systems shall conform to the Michigan mechanical code. The design and

installation of all fire sprinkler systems and standpipe systems shall conform to the Michigan building code. Water and drainage connections to such installations shall be made in accordance with the requirements of the code.

Exception: Detached 1-and 2-family dwellings and multiple single-family dwellings (townhouses) not more than 3 stories high with separate means of egress and their accessory structures shall comply with the Michigan residential code.

History: 1979 AC; 1980 AACS; 1982 AACS; 1998-2000 AACS; 2001 AACS; 2010 AACS.

R 408.30712 Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1998-2000 AACS; 2001 AACS.

R 408.30713 Vertical conductors and leaders.

Rule 713. Section 1106.2 and table 1106.2(1) of the code is amended to read as follows:

1106.2 Vertical conductors and leaders shall be sized for the maximum projected roof area, in accordance with Table 1106.2.

TABLE 1106.2  
SIZE OF VERTICAL CONDUCTORS AND LEADERS

DIAMETER OF LEADER (inches) <sup>a</sup>	HORIZONTALLY PROJECTED ROOF AREA (square feet)											
	Rainfall rate (inches per hour)											
	1	2	3	4	5	6	7	8	9	10	11	12
2	2,880	1,440	960	720	575	480	410	360	320	290	260	240
3	8,800	4,400	2,930	2,200	1,760	1,470	1,260	1,100	980	880	800	730
4	18,400	9,200	6,130	4,600	3,680	3,070	2,630	2,300	2,045	1,840	1,675	1,530
5	34,600	17,300	11,530	8,650	6,920	5,765	4,945	4,325	3,845	3,460	3,145	2,880
6	54,000	27,000	17,995	13,500	10,800	9,000	7,715	6,750	6,000	5,400	4,910	4,500
8	116,000	58,000	38,660	29,000	23,200	19,315	16,570	14,500	12,890	11,600	10,545	9,600

For SI: 1 inch = 25.4 mm, 1 square foot = 0.0929 m<sup>2</sup>.

a. Sizes indicated are the diameter of circular piping. This table is applicable to piping of other shapes provided the cross-sectional shape fully encloses a circle of the diameter indicated in this table.

History: 1982 AACS; 199-2000 AACS; 2001 AACS; 2010 AACS.

R 408.30714 Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1998-2000 AACS; 2001 AACS; 2010 AACS.

R 408.30715 Permits.

Rule 715. Sections 106.4, 106.5.3, and 106.5.4 of the code are amended to read as follows:

106.4. By whom application is made. Application for a permit shall be made by a plumbing contractor licensed in accordance with 2002 PA 733, MCL 338.3511 et seq.

Exceptions:

1. Water service permits.

2. Building sewer and private sewer permits.

3. Minor repair.

106.5.3. Expiration. Each permit issued by the code official under the provisions of the code shall expire by limitation and become null and void if the work authorized by such permit is not commenced within 180 days from the date of such permit, or if the work authorized by such permit is suspended or abandoned at any time after the work is commenced for a period of 180 days.

Before such work may be recommenced, a new permit shall be first obtained for such work, provided no changes have been made or will be made in the original construction document for such work and provided further that such suspension or abandonment has not exceeded 1 year.

106.5.4. Extensions. Any permittee holding an unexpired permit shall have the right to apply for an extension of the time within which the permittee will commence work under that permit when work is unable to be commenced within the time required by this section for good and satisfactory reasons.

The code official shall extend the time for action by the permittee for a period not exceeding 180 days if there is reasonable cause. No permit shall be extended more than once.

History: 1979 AC; 1982 AACS; 1985 AACS; 1992 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS.

R 408.30716 Fees.

Rule 716. Section 106.6 of the code is amended to read as follows:

Rule 106.6. Fees. The fees prescribed by the act shall be paid to the enforcing agency of the jurisdiction before a permit to begin work for new construction, alteration, removal, demolition, or other building operation may be issued. In addition, an amendment to a permit necessitating an additional fee shall not be approved until the additional fee is paid.

History: 1982 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS.

R 408.30717 Duties and powers of code official.

Rule 717. Sections 104.1 and 104.4 of the code are amended to read as follows:

104.1 General. The code official shall enforce all of the provisions of the code and shall act on any question relative to the installation, alteration, repair, maintenance, or operation of all plumbing systems, devices, and equipment except as specifically provided for by statutory requirements or as provided for in sections 104.3 to 104.8.

104.4. Right of entry. In the discharge of duties, the code official may enter any building, structure, or premises in the jurisdiction to enforce the provisions of the act and the code.

History: 1982 AACS; 1985 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS; 2010 AACS.

R 408.30718 Violation penalties.

Rule 718. Section 108.4 of the code is amended to read as follows:

108.4. Violation penalties. A person who violates a provision of the code, who fails to conform with any of the requirements thereof, or who erects, installs, alters, or repairs plumbing work in violation of the approved construction documents or directive of the enforcing agency, or a permit or certificate issued under the provisions of the code shall be assessed a fine in accordance with the act and 2002 PA 733, MCL 338.3511 to 338.3569.

History: 1982 AACS; 1985 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS.

R 408.30719 Stop work orders.

Rule 719. Section 108.5 of the code is amended to read as follows:

108.5. Stop work orders. Upon notice from the enforcing agency of work on any plumbing system that is being done contrary to the provisions of the code or in a dangerous or unsafe manner, the work shall immediately cease. Notice shall be in accordance with the act. A person who is served with a stop work order, except for work that the person is directed to perform to remove a violation or unsafe condition is subject to the penalty provisions prescribed by the act.

History: 1982 AACS; 1985 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS.

R 408.30720 Means of appeal.

Rule 720. Section 109.1 of the code is amended to read as follows:

109.1 Means of appeal. An interested person has the right to appeal a decision of the enforcing agency to the board of appeals in accordance with the act. An application for appeal shall be based on a claim that the true intent of the code or the rules governing construction have been incorrectly interpreted, the provisions of the code do not apply, or an equal or better form of construction is proposed. The decision of a local board of appeals may be appealed to the construction code commission in accordance with the act and time frames.

History: 1982 AACS; 1985 AACS; 1989 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS.

R 408.30721 Required tests.

Rule 721. Section 312.1 of the code is amended to read as follows:

312.1. Required tests. The permit holder shall make the applicable tests prescribed in sections 312.2 to 312.10.2 to determine compliance with the code. The permit holder shall give reasonable advance notice to the code official when the plumbing work is ready for testing. The equipment, material, power, and labor necessary for the inspection and test shall be furnished by the permit holder and the permit holder shall be responsible for determining that the work will withstand the test pressure prescribed in this rule. All plumbing system piping shall be tested with either water or, for piping systems other than plastic, by air. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be submitted to final tests. The code official shall require the removal of any cleanouts if necessary to ascertain if the pressure has reached all parts of the system.

Exception: Drainage and vent low pressure air tests for plastic piping systems shall be acceptable as prescribed in section 312.3 of the code.

History: 2003 AACS; 2010 AACS.

R 408.30722 Separate facilities.

Rule 722. Section 403.2 of the code is amended to read as follows:

403.2. Separate facilities. Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for private facilities.
2. Separate employee facilities shall not be required in occupancies in which 15 or fewer people are employed.
3. Separate facilities shall not be required in structures or tenant spaces with a total occupant load, including both employees and customers, of 15 or fewer.

History: 1979 AC; 1982 AACS; 2003 AACS.

R 408.30723 Distance of trap from vent.

Rule 723. Section 906.1 of the code is amended to read as follows:

906.1 Distance of trap from vent. Each fixture trap shall have a protecting vent located so that the slope and the developed length in the fixture drain from the trap weir to the vent fitting are within the requirements in table 906.1.

History: 1979 AC; 1982 AACS; 2003 AACS; 2007 AACS.

R 408.30724 Piping.

Rule 724. Section 1113.1.4 of the code is amended to read as follows:

1113.1.4. Discharge piping shall meet the requirements of section 1102.2, 1102.3, or 1102.4 and shall include a gate valve and a full flow check valve.

Pipe and fittings shall be the same size as, or larger than, pump discharge tapping.

History: 1979 AC; 1980 AACS; 1998-2000 AACS; 2010 AACS.

R 408.30725 Industrial or commercial wastes.

Rule 725. Section 302.2 of the code is amended to read as follows:

302.2. Industrial or commercial wastes. Industrial or commercial wastes shall not be introduced into the public sewer or private disposal system without receiving prior approval in the following manner:

(a) Industrial or commercial wastes discharged to a public sewer system are subject to review, approval, and regulation by the owner of the sewage treatment system under the authority of the federal water pollution control act of 1972, as amended, 33 U.S.C.1251 et seq., and sections 3101 to 3119 of Act No. 451 of the Public Acts of 1994, as amended, being 324.3101 to 324.3119 of the Michigan Compiled Laws.

(b) Industrial or commercial wastes discharged to an on-site disposal system are subject to review, approval, and regulation by the Michigan department of environmental quality under the authority of sections 3101 to 3119 of Act No.

451 of the Public Acts of 1994, as amended, being 324.3101 to 324.3119 of the Michigan Compiled Laws.

(c) Industrial or commercial wastes discharged to an on-site holding tank are subject to review, approval, and regulation under sections 3101 to 3119, 11101 to 11152, and 12101 to 12118 of Act No. 451 of the Public Acts of 1994, as amended, being 324.3101 to 324.3119, 324.11101 to 324.11152 and 324.12101 to 324.12118 of the Michigan Compiled Laws, and the federal resource conservation and recovery act of 1976, as amended, 42 U.S.C.6901 et seq.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30725a Radioactive material.

Rule 725a. Section 302.2.1 is added to the code to read as follows:

302.2.1. Radioactive material. Possession of radioactive material is regulated by state or federal license. The disposal of radioactive material shall not create a hazard to operational or maintenance personnel of the institution or to the public. Radioactive waste disposal is controlled by the Michigan department of environmental quality by conditions for disposal in a radioactive material license issued under the authority of part 135 of Act No. 368 of the Public Acts of 1978, as amended, being 333.13501 et seq. of the Michigan Compiled Laws, and the ionizing radiation rules, being R 325.5001 et seq.

of the Michigan Administrative Code, or is controlled by the United States nuclear regulatory commission by conditions for disposal in a license issued under the authority of the atomic energy act of 1954, 42 U.S.C. 2011 et seq.

History: 1979 AC; 1980 AACS; 1982 AACS; 1998-2000 AACS.

R 408.30725b Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30725c Venting of fixture drains.

Rule 725c. Section 906.2 of the code is amended to read as follows:

906.2. Venting of fixture drains. The vent for a fixture drain, except where serving a fixture with integral traps, such as water closets, shall connect above the weir of the fixture trap being vented. The total slope shall not exceed the diameter of the fixture drain.

History: 1992 AACS; 1998-2000 AACS; 2007 AACS; 2010 MR 8, Eff. Aug. 20, 2010.

R 408.30726 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30728 Sewer depth.

Rule 728. Section 305.6.1 of the code is amended to read as follows:

305.6.1. Sewer depth. A building sewer that connects to a private disposal system shall be a minimum of 8 inches to the top of the pipe below finished grade at the point of septic tank connection. Building sewers shall be installed a minimum of 42 inches below grade.

Exception: When permitted by the code official.

History: 1989 AACS; 1998-2000 AACS; 2001 AACS.

R 408.30730 Sewer required.

Rule 730. Section 701.2 of the code is amended to read as follows:

701.2. Sewer required. Every building in which plumbing fixtures are installed and all premises having drainage piping shall be connected to a public sewer, where available, or an approved private sewage disposal system.

History: 1989 AACS; 1992 AACS; 1997 AACS; 2003 AACS; 2007 AACS.

R 408.30731. Laundries.

Rule 731. Section 1003.6 of the code is amended to read as follows:

1003.6. Laundries. Commercial laundries shall be equipped with an interceptor with a wire basket or similar device, removable for cleaning, that prevents passage into the drainage system of solids 0.5 inch (12.7 mm) or larger in size, string, rags, buttons or other materials detrimental to the public sewage system.

History: 1979 AC; 1982 AACS; 1997 AACS; 2007 AACS.

R 408.30732 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1997 AACS.

R 408.30733 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1997 AACS.

R 408.30734 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30735 Hot water supply required.

Rule 735. Section 607.1 of the code is amended to read as follows:

607.1. Where required. (1) In residential occupancies, hot water shall be supplied to all plumbing fixtures and equipment utilized for bathing, washing, culinary purposes, cleansing, laundry, or building maintenance. In nonresidential occupancies, hot water shall be supplied for culinary purposes, cleansing, laundry, or building maintenance purposes. In nonresidential occupancies, hot water or tempered water shall be supplied for bathing and washing purposes. Tempered water shall be supplied through a water temperature limiting device that conforms to ASSE 1070, as referenced in chapter 13 of the code, and shall limit the tempered water to a maximum of 110 degrees Fahrenheit (43 degrees Celsius). This provision shall not supersede the requirement for protective shower valves in accordance with section 424.3 of the code.

(2) Tempered water shall be supplied to bathing and hand washing facilities in the occupancies identified in subdivisions (a) to (h) of this subrule by individual water temperature limiting devices to individual fixtures.

- (a) Elementary schools.
- (b) Child care centers.
- (c) Day care centers.
- (d) Nurseries.
- (e) Adult group homes.
- (f) Adult congregate homes.
- (g) Children's camps.
- (h) At accessible plumbing fixtures.

History: 1998-2000 AACS; 2001 AACS; 2007 AACS.

R 408.30736 Rescinded.

History: 1979 AC; 1985 AACS; 1997 AACS.

R 408.30737 Rescinded.

History: 1979 AC; 1989 AACS; 1998-2000 AACS.

R 408.30738 Rescinded.

History: 1979 AC; 1985 AACS; 1989 AACS; 1997 AACS.

R 408.30738a Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30739 Rescinded.

History: 1989 AACS; 1992 AACS; 1997 AACS.

R 408.30740 Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30740a Rescinded.

History: 1989 AACS; 1992 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS.

R 408.30740b Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30741 Rescinded.

History: 1979 AC; 1985 AACS; 1989 AACS.

R 408.30741a Rescinded.

History: 1979 AC; 1985 AACS; 1989 AACS.

R 408.30741b Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1985 AACS; 1989 AACS.

R 408.30741c Connections to automatic fire sprinkler systems and standpipe systems.

Rule 741c. Section 608.16.4 of the code is amended to read as follows:

608.16.4. Connections to automatic fire sprinkler systems and standpipe systems. The potable water supply to automatic fire sprinkler systems and standpipe systems shall be protected against backflow by a double check-valve assembly or a reduced pressure principle backflow preventer.

Exception: Isolation of the water distribution system is not required for deluge, preaction, or dry pipe systems.

History: 1979 AC; 1985 AACS; 1989 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS; 2007 AACS.

R 408.30742 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30743 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30743a Rescinded.

History: 1979 AC; 1985 AACS; 1998-2000.



R 408.30743b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30743c Rescinded.

History: 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30744 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30744a Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30744b Rescinded.

History: 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30744c Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30744d Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30744e Rescinded.

History: 1992 AACS; 1998-2000 AACS; 2001 AACS; 2003 AACS.

R 408.30744f Rescinded.

History: 1992 AACS; 1998-2000 AACS.

R 408.30745 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30745a Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1997 AACS.

R 408.30745b Rescinded.

History: 1982 AACS; 1985 AACS; 1989 AACS; 1997 AACS.

R 408.30746 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30746a Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1992 AACS; 1997 AACS.

R 408.30746b Rescinded.

History: 1982 AACS; 1989 AACS; 1992 AACS; 1997 AACS.

R 408.30747 Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1992 AACS; 1997 AACS.

R 408.30747a Rescinded.

History: 1982 AACS; 1985 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30747b Rescinded.

History: 1982 AACS; 1985 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30747c Rescinded.

History: 1982 AACS; 1985 AACS; 1989 AACS; 1997 AACS.

R 408.30748 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30748a Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1997 AACS.

R 408.30748b Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1997 AACS.

R 408.30748c Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1997 AACS.

R 408.30749 Special equipment; water supply protection.

Rule 749. Section 608.3.1 of the code is amended to read as follows:

608.3.1. Special equipment; water supply protection. The water supply for hospital fixtures shall be protected against backflow with a reduced pressure principle backflow preventer, an atmospheric or spill-proof vacuum breaker, or an air gap. Vacuum breakers for bedpan washer hoses, autopsy tables, and hose connections in health care or laboratory areas shall not be located less than 6 feet (1829 mm) above the floor.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1998-2000 AACS; 2001 AACS; 2007 AACS; 2010 AACS.

R 408.30749a Rescinded.

History: 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30750 Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30751 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30751a Rescinded.

History: 1992 AACS; 1998-2000 AACS.

R 408.30752 Rescinded.

History: 1979 AC; 1980 AACS; 1997 AACS.

R 408.30752a Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30753 Rescinded.

History: 1954 ACS 81, Eff. May 19, 1975; 1954 ACS 91, Eff. June 16, 1977.

R 408.30753a Roof extensions.

Rule 753a. Section 904.1 of the code is amended to read as follows:

904.1. Roof extension. All open vent pipes that extend through a roof shall be terminated at least 1 foot (305 mm) above the roof, except that if a roof is to be used for any purpose other than weather protection, then the vent extensions shall be run not less than 7 feet (2134 mm) above the roof.

History: 1998-2000 AACS.

R 408.30754 Rescinded.

History: 1954 ACS 81, Eff. May 19, 1975; 1954 ACS 91, Eff. June 16, 1977.

R 408.30754a Frost closure.

Rule 754a. Section 904.2 of the code is amended to read as follows:

904.2. General. To prevent frost closure, every vent extension through a roof shall be a minimum of 3 inches in diameter. Any increase in the size of the vent shall be made inside the building a minimum of 1 foot below the roof or inside the wall.

History: 1992 AACS; 1998-2000 AACS.

R 408.30754b Extensions outside a structure.

Rule 754b. Section 904.7 of the code is amended to read as follows:

904.7. Extensions outside a structure. Vent pipes installed on the exterior of the structure shall be protected against freezing by insulation or heat, or both.

History: 1998-2000 AACS; 2001 AACS.

R 408.30754c Rescinded.

History: 1998-2000 AACS; 2001 AACS.

R 408.30755 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30756 Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30756a Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30757 Horizontal drains within buildings and building sewers.

Rule 757. Section 708.3.1 of the code is amended to read as follows:

708.3.1. Horizontal drains within buildings and building sewers. All horizontal drains within buildings and building sewers shall be provided with cleanouts located not more than 100 feet apart.

For underground piping that is more than 10 inches in diameter, manholes shall be provided and located at every major change of direction, grade, elevation, or size of pipe or at intervals of not more than 400

feet. Metal covers shall be provided for the manholes and shall be of sufficient weight to meet local traffic and loading conditions.

Within buildings, manhole covers shall be gastight and the manhole shall be vented with not less than a 4-inch pipe.

History: 1979 AC; 1998-2000 AACCS; 2001 AACCS.

R 408.30758 Minimum number of fixtures.

Rule 758. Sections 403.1 and 403.3.1 and Table 403.1 of the code are amended to read as follows:

403.1. Minimum number of fixtures. Plumbing fixtures shall be provided for the type of occupancy and in the minimum number shown in Table 403.1.

Types of occupancies not shown in Table 403.1 shall be considered individually by the code official. The number of occupants shall be determined in accordance with the Michigan building code. Occupancy classification shall be determined in accordance with the Michigan building code.

Exceptions:

1. The actual number of occupants determined by a supporting affidavit from the owner or agency.
2. Hand washing sinks in food service establishments shall be provided in accordance with regulation no. 553, food establishments, R 285.553.1 to R 285.553.26 of the Michigan department of agriculture.
3. Toilet facilities for public swimming pools shall be provided in accordance with public swimming pools, R 325.2111 to R 325.2199 of the Michigan department of environmental quality.
4. Toilet facilities for child care center, day care center, and nursery school facilities shall be provided in accordance with child day care licensing - child care centers, R 400.5101 to R 400.5940 of the Michigan department of human services.
5. Toilet facilities for children's camps shall be provided in accordance with children's and adult foster care camps, R 400.11101 to R 400.11319 of the Michigan department of human services.

403.3.1. Access. The route to the public toilet facilities required by section 403.3 shall not pass through kitchens, storage rooms, or closets.

Access to the required facilities shall be from within the building. All routes shall comply with the accessibility requirements of the Michigan building code. The public shall have access to the required toilet facilities at all times that the building is occupied.

TABLE 403.1  
 MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES<sup>a</sup>  
 (See Sections 403.2 and 403.3)

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS SEE SECTION 419.2)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAIN <sup>c,f</sup> (SEE SECTION 410.1)	OTHER
				MALE	FEMALE	MALE	FEMALE			
1	Assembly	A-1 <sup>d</sup>	Theaters and other buildings for the performing arts and motion pictures	1 per 125	1 per 65	1 per 200			1 per 500	1 service sink
		A-2 <sup>d</sup>	Nightclubs, bars, taverns, dance halls and buildings for similar purposes	1 per 40	1 per 40	1 per 75			1 per 500	1 service sink
			Restaurants, banquet halls and food courts	1 per 75	1 per 75	1 per 200			1 per 500	1 service sink
		A-3 <sup>d</sup>	Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums	1 per 125	1 per 65	1 per 200			1 per 500	1 service sink

		Passenger terminals and transportation facilities	1 per 500	1 per 500	1 per 750			1 per 1,000	1 service sink
		Places of worship and other religious services.	1 per 150	1 per 75	1 per 200			1 per 1,000	1 service sink
	A-4	Coliseums, arenas, skating rinks, pools and tennis courts for indoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,500 and 1 per 60 for the remainder exceeding 1,500	1 per 200	1 per 150		1 per 1,000	1 service sink
	A-5	Stadiums, amusement parks, bleachers, and grandstands for outdoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,500 and 1 per 60 for the remainder exceeding 1,500	1 per 200	1 per 150		1 per 1,000	1 service sink
	A-5	Outdoor educational and municipal venues no larger than 3,000 spectators	1 per 125	1 per 65	1 per 200	1 per 150		1 per 1,000	1 service sink

2	Business	B	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial, and similar uses	1 per 25 for the first 50 and 1 per 50 for the remainder exceeding 50	1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80		1 per 100	1 service sink
3	Educational	E	Educational facilities	1 per 50	1 per 50		1 per 100	1 service sink
4	Factory and industrial	F-1 and F-2	Structures in which occupants are engaged in work fabricating, assembly, or processing of products or materials	1 per 100	1 per 100	(see Section 411)	1 per 400	1 service sink
5	Institutional	I-1	Residential care	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
		I-2	Hospitals, ambulatory nursing home patients <sup>b</sup>	1 per room c	1 per room c	1 per 15	1 per 100	1 service sink per floor
			Employees, other than residential care <sup>b</sup>	1 per 25	1 per 35		1 per 100	



			Visitors, other than residential care	1 per 75	1 per 100		1 per 500	
		I-3	Prisons <sup>b</sup>	1 per cell	1 per cell	1 per 15	1 per 100	1 service sink
			Reformatories, detention centers, and correctional centers <sup>b</sup>	1 per 15	1 per 15	1 per 15	1 per 100	1 service sink
			Employees <sup>b</sup>	1 per 25	1 per 35	-	1 per 100	-
		I-4	Adult day care and child care	1 per 15	1 per 15		1 per 100	1 service sink

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS SEE SECTION 419.2)		LAVATORIES		BATHTUBS/SHOWERS	DRINKING FOUNTAIN <sup>e,f</sup> (SEE SECTION 410.1)	OTHER
				MALE	FEMALE	MALE	FEMALE			
6	Mercantile	M	Retail stores, service stations, shops, salesrooms, markets, and shopping centers	1 per 500		1 per 750		-	1 per 1000	1 service sink
7	Residential	R-1	Hotels, motels, boarding houses (transient)	1 per sleeping unit		1 per sleeping unit		1 per sleeping unit		1 service sink

R-2	Dormitories, fraternities, sororities, and boarding houses (not transient)	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
R-2	Apartment house	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	-	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units
R-3	One- and two-family dwellings	1 per dwelling unit	1 per dwelling unit	1 per dwelling unit	-	1 kitchen sink per dwelling unit; 1 automatic clothes washer per dwelling unit
R-3	Congregate living facilities with 16 or fewer persons	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
R-4	Residential care assisted living facilities	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink

8	Storage <sup>8</sup>	S-1 S-2	Structures for the storage of goods, warehouses, storehouse, and freight depots. Low and Moderate Hazard	1 per 100	1 per 100	See Section 411	1 per 1,000	1 service sink
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- a. The fixtures shown are based on 1 fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by the International Building Code.
- b. Toilet facilities for employees shall be separate from facilities for inmates or patients.
- c. A single-occupant toilet room with 1 water closet and one lavatory serving not more than 2 adjacent patient sleeping units shall be permitted where such room is provided with direct access from each patient room and with provisions for privacy.
- d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
- e. The minimum number of required drinking fountains shall comply with Table 403.1 and Chapter 11 of the International Building Code.
- f. Drinking fountains are not required for an occupant load of 15 or fewer.
- g. Structures not designed for occupants or as an employee's regular working area, are not required to have toilet facilities.

History: 1979 AC; 1985 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS; 2001 AACS; 2007 AACS; 2010 AACS.

R 408.30758a Rescinded.

History: 1979 AC; 1980 AACS; 1985 AACS; 1997 AACS.

R 408.30758b Rescinded.

History: 1979 AC; 1980 AACS; 1985 AACS; 1997 AACS.

R 408.30758c Rescinded.

History: 1979 AC; 1980 AACS; 1985 AACS; 1997 AACS.

R 408.30758d Rescinded.

History: 1979 AC; 1980 AACS; 1985 AACS; 1997 AACS.

R 408.30759 Rescinded.

History: 1979 AC; 1985 AACS; 1998-2000 AACS.

R 408.30759a Rescinded.

History: 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30759b Rescinded.

History: 1992 AACS; 1998-2000 AACS; 2001 AACS.

R 408.30760 Rescinded.

History: 1985 AACS; 1989 AACS; 1998-2000 AACS; 2001 AACS.

R 408.30761 Rescinded.

History: 1979 AC; 1982 AACS; 1998-2000 AACS.

R 408.30761a Rescinded.

History: 1989 AACS; 1998-2000 AACS.

R 408.30761b Rescinded.

History: 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30761c Rescinded.

History: 1998-2000 AACS; 2001 AACS.

R 408.30762 Floor drains; public toilet rooms.

Rule 762.Section 412.5 is added to the code to read as follows:

412.5. Floor drains; public toilet rooms. In all public toilet rooms that contain a combination of 3 or more water closets or urinals, at least 1 approved floor drain shall be installed connecting to the sanitary system; however, stall urinals may serve as floor drains if the entire floor can be drained to the urinals.

History: 1979 AC; 1982 AACS; 1985 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30762a Rescinded.

History: 1980 AACS; 1982 AACS; 1997 AACS.

R 408.30763 Floor drain; floor area.

Rule 763. Section 412.6 is added to the code to read as follows:

412.6. Floor drains according to floor area. In all toilet rooms in which floor drains are required, there shall be at least 1 floor drain for each 400 square feet of floor area or major fraction thereof.

History: 1979 AC; 1982 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30763a Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30763b Rescinded.

History: 1982 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30763c Rescinded.

History: 1985 AACS; 1989 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30764 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30765 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30765a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30765b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30765c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30765d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30765e Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30766 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30766a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30766b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30766c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30766d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30767 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30767a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30768 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30768a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30768b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30769 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30769a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30769b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30769c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30770 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30770a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30770b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30771 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30771a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30771b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30771c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30771d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30771e Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30772 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30772a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30772b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30772c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30772d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30772e Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30773 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30773a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.



R 408.30773b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30773c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30773d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774e Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30774f Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30775 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30775a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30775b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30775c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30775d Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30776 Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30776a Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30776b Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30776c Rescinded.

History: 1979 AC; 1989 AACS; 1997 AACS.

R 408.30777 Scope; water service; distance limits; method of installations.

Rule 777. Section 601.1 of the code is amended to read as follows:

601.1. Scope. The provisions of this article shall control the design and installation of water supply systems, both hot and cold. Refer to 1976 PA 399, MCL 325.1001 to 325.1023, for additional requirements on water supply systems pertaining to establishments that are subject to regulation or licensure, or both, by the department of environmental quality.

Compliance with the provisions of this article, however, does not relieve any person from complying with the additional requirements imposed upon water supply systems pursuant to authority vested in the Michigan department of environmental quality under 1976 PA 399, MCL 325.1001 to 325.1023, 1978 PA 368, MCL 333.1101 to 333.25211, and 1987 PA 96, MCL 125.2301 to 125.2350, or other applicable provisions of state law.

History: 1979 AC; 1980 AACS; 1982 AACS; 1985 AACS; 1989 AACS; 1998-2000 AACS; 2003 AACS; 2007 AACS.

R 408.30777a Rescinded.

History: 1979 AC; 1982 AACS; 1998-2000 AACS.

R 408.30777b Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 1989 AACS; 1997 AACS.

R 408.30777c Rescinded.

History: 1982 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30777d Rescinded.

History: 1982 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30777e Rescinded.

History: 1982 AACS; 1998-2000 AACS.

R 408.30778 Rescinded.

History: 1979 AC; 1982 AACS; 1998-2000 AACS.

R 408.30778a Rescinded.

History: 1979 AC; 1982 AACS; 1998-2000 AACS.

R 408.30778b Rescinded.

History: 1979 AC; 1982 AACS; 1992 AACS; 1998-2000 AACS.

R 408.30778c Rescinded.

History: 1982 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30779 Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30779a Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30779b Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30780 Rescinded.

History: 1979 AC; 1982 AACS; 1998-2000 AACS.

R 408.30780a Rescinded.

History: 1979 AC; 1982 AACS; 1998-2000 AACS.

R 408.30780b Rescinded.

History: 1982 AACS; 1998-2000 AACS.

R 408.30780c Rescinded.

History: 1985 AACS; 1989 AACS.

R 408.30781 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30781a Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30781b Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30781c Rescinded.

History: 1979 AC; 1980 AACS; 1982 AACS; 1997 AACS.

R 408.30781d Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30781e Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30782 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30783 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30784 Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30785 Requirements for discharge piping.

Rule 785. Section 504.6 of the code is amended to read as follows:

504.6. Requirements for discharge piping. (1) Relief valves shall not discharge so as to be a hazard, a potential cause of damage, or a nuisance.

A relief valve discharge pipe shall be provided for each individual relief valve and shall meet all of the following:

(a) Shall terminate atmospherically not more than 4 inches (1220 mm) from the floor with an unthreaded end.

(b) Shall not be interconnected.

(c) Valves shall not be connected in the relief valve discharge pipe.

(d) Shall be rigid pipe approved for water distribution, with a minimum temperature rating of 210 degrees Fahrenheit.

(e) Shall have the same nominal inside diameter as the relief valve outlet and shall drain by gravity flow.

(f) Shall discharge to the floor, to the pan serving the water heater or storage tank, or to a waste receptor.

(2) The outlet of a pressure, temperature or other relief valve shall not be directly connected to the drainage system.

History: 1979 AC; 1982 AACS; 1989 AACS; 1998-2000 AACS; 2001 AACS; 2007 AACS; 2010 AACS.

R 408.30786 Sizing of secondary drains.

Rule 786. Section 1107.3 of the code is amended to read as follows:

1107.3. Sizing of secondary drains. Secondary, or emergency, roof drain systems shall be sized in accordance with section 1106 based on the rainfall rate for which the primary system is sized in tables 1106.2 and 1106.3.

Scuppers shall be sized to prevent the depth of ponding water from exceeding that for which the roof was designed as determined by section 1101.7.

Scuppers shall not have an opening dimension of less than 4 inches (102 mm).

The flow through the primary system shall not be considered when sizing the secondary roof drain system.

History: 1998-2000 AACS; 2001 AACS; 2003 AACS.

R 408.30788 Rescinded.

History: 1979 AC; 1982 AACS; 1989 AACS; 1998-2000 AACS.

R 408.30788a Rescinded.

History: 1979 AC; 1982 AACS; 1997 AACS.

R 408.30791 Definitions.

Rule 791. Section 202 of the code is amended to amend the definition of code official and add the definitions of the act and plumbing contractor.

"Act" means 1972 PA 230, MCL 125.1501 and known as the Stille-DeRossett-Hale single state construction code act.

"Code official" means the person appointed and employed by a governmental subdivision charged with the administration and enforcement of the state code or codes and registered in accordance with the requirements of 1986 PA 54, MCL 338.2301 to 338.2313.

"Plumbing contractor" means a person who is licensed in accordance with 2002 PA 733, MCL 338.3511 to 338.3569.

History: 1979 AC; 2001 AACS; 2003 AACS; 2007 AACS.

R 408.30792 Plumbing contractor.

Rule 792. (1) To obtain plumbing permits, an applicant shall do all of the following:

(a) Be a plumbing contractor in this state.

(b) Be active in the business of serving the public as a plumbing contractor in a county, city, village, or township in this state.

(c) Operate 1 or more branches in this state bearing the same firm name, when a licensed master plumber is in charge and has the responsibility of supervision at each branch. The names of the authorized master plumbers representing a firm shall be on record with the state plumbing board.

(2) To become a plumbing contractor, an application shall be made on a form furnished by the state plumbing board and filed with the board at Okemos, Michigan. An incomplete application will be returned to the applicant.

History: 1979 AC; 2003 AACS.

R 408.30793 Rescinded.

History: 1979 AC; 2003 AACS.

R 408.30795 Rescinded.

History: 1979 AC; 2001 AACS.

R 408.30795a Rescinded.

History: 1982 AACS; 2001 AACS.

R 408.30796 Rescinded.

History: 1979 AC; 1982 AACS; 1985 AACS; 2001 AACS.