

1.1 **Minnesota Plumbing Board**

1.2 **Adopted Permanent Rules Governing the Plumbing Code**

1.3 **4715.0100 DEFINITIONS.**

1.4 [For text of subps 1 to 56, see M.R.]

1.5 Subp. 56a. **Gravity grease interceptor.** "Gravity grease interceptor" means a grease
1.6 interceptor identified by volume, retention time, and gravity separation.

1.7 [For text of subp 57, see M.R.]

1.8 Subp. 57a. **Grinder pump.** A "grinder pump" is a specialized submersible pump
1.9 designed for reducing sewage particulates and pumping the resulting slurry.

1.10 [For text of subps 58 to 60, see M.R.]

1.11 Subp. 60a. **Hydromechanical grease interceptor.** "Hydromechanical grease
1.12 interceptor" means a grease interceptor that incorporates air entrainment, hydromechanical
1.13 separation, interior baffling, and/or barriers in combination or separately.

1.14 [For text of subps 61 to 70, see M.R.]

1.15 Subp. 70a. **Macerating toilet system.** "Macerating toilet system" means a system
1.16 consisting of a toilet and a sump with a macerating pump. The system is intended to
1.17 receive and break waste from a toilet, bathtub, shower, or lavatory into pieces of fine
1.18 slurry and pump to the building drainage.

1.19 [For text of subps 71 to 112, see M.R.]

1.20 Subp. 113. **Trap seal.** "Trap seal" means the vertical distance between the crown
1.21 weir and the top dip of the trap.

1.22 [For text of subps 114 to 128, see M.R.]

1.23 **4715.0420 STANDARDS FOR PLUMBING MATERIALS.**

2.1 [For text of subp 1, see M.R.]

2.2 Subp. 2. **Abbreviations.** Abbreviations in this chapter refer to the following:

2.3 A. ASME, American Society of Mechanical Engineers, Three Park Avenue,
2.4 New York, NY 10016-5990;

2.5 B. ANSI, American National Standards Institute, 1899 L Street, NW, 11th
2.6 Floor, Washington, D.C. 20036;

2.7 C. ASTM, American Society for Testing and Materials, 100 Barr Harbor Drive,
2.8 P.O. Box C700, West Conshohocken, PA 19428-2959;

2.9 D. AWWA, American Water Works Association, 6666 W. Quincy Avenue,
2.10 Denver, CO 80235;

2.11 E. CSA, Canadian Standards Association, 5060 Spectrum Way, Suite 100,
2.12 Mississauga, Ontario, Canada L4W 5N6;

2.13 F. CS, Commercial Standards available from: U. S. Department of Commerce,
2.14 Bureau of Industry and Security, 14th Street & Constitution Avenue NW, Washington,
2.15 D. C. 20230;

2.16 G. FS, Federal Specifications available from: Federal Supply Service, Standards
2.17 Division, U.S. General Services Administration, One Constitution Square, 1275 - 1st
2.18 Street NE, Washington, D. C. 20417;

2.19 H. NSF, NSF International 789 N. Dixboro Road, P.O. Box 130140, Ann
2.20 Arbor, MI 48113-0140;

2.21 I. FHA, Federal Housing Administration, Architectural Standards Division,
2.22 U.S. Department of Housing & Urban Development, 451 - 7th Street SW, Washington,
2.23 D. C. 20410;

3.1 J. AASHTO, American Association of State and Highway Transportation
 3.2 Officials, 444 North Capital Street Northwest, Suite 249, Washington, D. C. 20001;

3.3 K. IAPMO, International Association of Plumbing and Mechanical Officials,
 3.4 4755 E. Philadelphia St., Ontario, CA 91761;

3.5 L. ASSE, American Society of Sanitary Engineering, 901 Canterbury, Suite
 3.6 A, Westlake, OH 44145;

3.7 M. ASPE, American Society of Plumbing Engineers, 2985 S. River Road, Des
 3.8 Plaines, IL 60018.

3.9 Subp. 3. **Standards for plumbing materials.**

3.10		DESCRIPTION	ANSI	ASTM	FS	OTHER
3.11	I.	CAST IRON PIPE AND FITTINGS				
3.12			A21.2			
3.13			A21.6	A-74	WW-P-401C	CS188
3.14	1A	Cast Iron Pipe and				
3.15		Fittings Extra Heavy	A21.8			
3.16	1B	Cast Iron Pipe				
3.17		Centrifugally Cast				
3.18		Only and Fittings	A21.6	A-74	WW-P-401C	CS188
3.19		Service Weight	A21.8			
3.20	1C	Cast Iron Mechanical	A21.11			
3.21		(Gland Type) Pipe	A21.2		WW-P-421a	
3.22			A21.6			
3.23	1D	Cast Iron Mechanical	A21.8			
3.24		(Gland Type) Pipe	A21.4			
3.25		Cement Lined	A21.2			
3.26			A21.6			
3.27			A21.8			

4.1	1E	Cast Iron Short	A21.10		AWWA C100
4.2		Body Water Service			
4.3		Fittings (2"-12")			
4.4	1F	Cast Iron Threaded	A40.5		
4.5		Pipe			
4.6	1G	High Silicon Pipe,			
4.7		Fittings Cast Iron			
4.8	1H	Cast Iron Threaded			
4.9		Fittings Black and			
4.10		Galvanized 125#	B16.4	WW-P-501	
4.11	1J	Cast Iron Drainage			
4.12		Fittings Black and			
4.13		Galvanized	B16.12	WW-P-491	
4.14	1K	Hubless Cast Iron	A888-07a		CISPI Standard
4.15		Pipe and Fittings			301-05
4.16					CSA/CAN
4.17					3-B70
4.18	1L	Ductile Iron Pipe			
4.19		Flanged	A21.15		AWWA C115
4.20	1M	Ductile Iron Pipe			
4.21		Push-on Joints,			
4.22		Mechanical Joints	A21.51		AWWA C151
4.23	II.	STEEL AND WROUGHT IRON PIPE FITTINGS			
4.24	2A	Steel Pipe, Welded			
4.25		and Seamless			
4.26		Galvanized,			
4.27		Schedule 40 and			
4.28		Above	B36.1	A53	
4.29			B36.20		WW-P-406
4.30					6(1)

5.1	2B	Wrought Iron Pipe,			
5.2		Galvanized Schedule			
5.3		40 and Above	B36.2		
5.4	2C(a)	Stainless Steel Pipe	B36.19		
5.5	2C(b)	Stainless Steel Pipe	A112.3.1		
5.6	2D	Galvanized			
5.7		Malleable Fittings			
5.8		150 psi and Above	B16.3	A197	
5.9	2E	Steel Unions,			
5.10		Galvanized			WW-V-531 C
5.11	2F	Corrugated Steel			
5.12		Pipe, Aluminized			
5.13		and fittings		A760	AASHTO M36
5.14		(18- to 120-inch)		A796	
5.15		(Storm only)			
5.16	III.	COPPER AND COPPER BASE PIPE AND FITTINGS			
5.17	3A	Red Brass Pipe,			
5.18		Regular and Heavier	H27.1	B42B	
5.19	3B	Seamless Brass Tube	H36.1		
5.20	3C	Brass or Bronze			
5.21		Threaded Fittings			
5.22		125 lbs. and Over	B16.15	B62	WW-P-460
5.23	3D	Brass or Bronze Flare			
5.24		Fittings 125 lbs. and			
5.25		Over, Heavy Duty			
5.26		Long Collar Type		B62	
5.27	3E	Seamless Copper			
5.28		Tube Type K, Soft			
5.29		Temper	H23.1	B88	

6.1	3F	Seamless Copper			
6.2		Tube Type K, Hard			
6.3		Temper	H23.1	B88	
6.4	3G	Seamless Copper			
6.5		Tube Type L, Soft			
6.6		Temper	H23.1	B88	
6.7	3H	Seamless Copper			
6.8		Tube Type L, Hard			
6.9		Temper	H23.1	B88	
6.10	3H(a)	Welded Copper Alloy			OFT194-101A
6.11		194 Water, Tube,			
6.12		Type "Heavy," Hard			Navfac
6.13		Temper		B543-72	TS-15400
6.14	3H(b)	Stainless Steel			
6.15		Water Tubing,			
6.16		Type SL, Copper			
6.17		Plated Coating			
6.18		(HWT-T439)		A-651	
6.19	3J	Seamless Copper			
6.20		Tube, Type M, Hard			
6.21		and Soft Temper	H23.1	B88	
6.22	3J(a)	Welded Copper Alloy			
6.23		194 Water			OFT194-101A
6.24		Tube, Type			
6.25		"Standard," Hard			Navfac
6.26		Temper		B543-72	TS-15400
6.27	3J(b)	Stainless Steel Water	A-268		
6.28		Tubing, Type			
6.29		SM, Copper			
6.30		Plated Coating			
6.31		(HWT-T439)		A-651	

7.1	3K	Seamless Copper			
7.2		Tube Type DWV	H23.3	B306	
7.3	3L	Copper Pipe I.P.S.	H26.1	B42	
7.4	3M	Copper Pipe,			
7.5		Threadless Type			
7.6		T P and Fittings	H26.2	B302	
7.7	3N	Cast Bronze and	B16.22		
7.8		Wrought Solder Joint	H23.1		
7.9		Pressure Fitting	B16.18		
7.10	3O	Cast Bronze and			
7.11		Wrought Solder Joint			
7.12		D W V Fittings	B16.23		
7.13	3P	Copper Alloy Water			
7.14		Tube 1/2 Inch and		B447	
7.15		3/4 Inch		B75	
7.16	3Q	Welded Brass Water		B587	
7.17		Tube 1/2 Inch and			
7.18		3/4 Inch			
7.19	3R	Removable and			NSF 61
7.20		Nonremovable			ASSE 1061-06
7.21		Push-Fit Fittings			
7.22		for Copper Pipe (3/8			
7.23		to 2 inches only)			
7.24	IV.	LEAD PIPE AND FITTINGS			
7.25	4A	Lead Pipe AA			WW-P-325-44
7.26	4B	Lead Pipe AAA			WW-P-325-44
7.27	4C	Lead Bends and			
7.28		Traps			WW-P-325-44

8.1	4D	Sheet Lead		QQ-L201d	
8.2	V.	SILICA AND EARTH PRODUCTS PIPE AND FITTINGS, NONMETALLIC			
8.3	5A	Asbestos-Cement	C500	SS-P351	
8.4		Pressure Pipe and Fitting	C296		
8.5	5B	Asbestos-Cement Water Pipe			
8.6		and Fittings	C500	SS-P-351	AWWA C400
8.7	5C	Asbestos-Cement Nonpressure			
8.8		Pipe and Fittings	C428	XX-P-331	
8.9	5D	Asbestos-Cement Perforated			
8.10		Underdrain Pipe and Fittings	C508		
8.11	5E	Vitrified Clay Pipe, Standard	C13		
8.12		Strength and Stronger Fittings	C200		
8.13	5F	Unglazed Clay Pipe, Extra			
8.14		Strength and Fittings	C278		
8.15	5G	Perforated Clay Pipe and			
8.16		Fittings	C211		
8.17	5H	Borosilicate Glass Pipe and			
8.18		Fittings 60 psi			
8.19	5J	Nonreinforced Concrete Drain			AASHTO
8.20		Tile	C412		M178
8.21					AASHTO
8.22					M86
8.23	5K	Nonreinforced Concrete Pipe	C14	SS-P-371	CSA-A257.1
8.24	5L	Perforated Concrete Pipe,			
8.25		Underdrainage	C444		
8.26	5M	Reinforced Concrete Pipe	C76	SS-P-375	CSA-A257.2

9.1	5N	Reinforced and Prestressed			
9.2		Concrete Pipe, Pressure Type			
9.3		and Fittings			
9.4	5O	Bituminized Fiber Drain and			
9.5		Sewer Pipe	D1860	SS-P-1540A	
9.6	5P	Perforated Bituminized Fiber			
9.7		Pipe for General Drainage	D2311	SS-P-1540A	
9.8	VI.	PLASTIC PIPE AND FITTINGS DRAIN, WASTE AND VENT			
9.9	6A	Acrylonitrile-Butadiene-Styrene	D2661	L-P-322a	NSF14
9.10		(ABS)		FHA-MPS	CSA-B181.1
9.11					CS270
9.12		Type 1, Schedule 40 Cellular			
9.13		core	F628		
9.14	6B	(1) Polyvinyl Chloride (PVC)	D2665	L-P-320a	NSF14
9.15		Schedule 40 Unthreaded		FHA-MPS	CS272
9.16		Schedule 80 can be threaded			CSA-B181.2
9.17		Cellular core	F891		
9.18		Fabricated Fittings (8- to	D3311		
9.19		24-inch)			
9.20		Fabricated Fittings (8-inch and	F1866		
9.21		larger with mitered joints 4-inch			
9.22		and larger)			
9.23	6B	(2) Polyvinyl Chloride (PVC)			
9.24		Schedule 30 (3-inch only)	D2949	L-P-001221	
9.25	6B	(3) Polyvinyl Chloride (PVC)			
9.26		Schedule 40 (14- to 24-inch			
9.27		only) with ASTM D3311 fittings	D1785		

10.1		Fabricated Fittings (8-inch and	F1866			
10.2		larger with mitered joints 4-inch				
10.3		and larger)				
10.4	6B	(4) Polyvinyl Chloride (PVC)				
10.5		Schedule 40 and 80 SDR 21 and				
10.6		SDR 26 (6-inch and larger)	D2241			
10.7	6B	(5) Corrugated Poly-vinyl				
10.8		Chloride (PVC) Schedule 40 (4-				
10.9		to 36-inch) with ASTM D3212				
10.10		fittings (Storm only)	F949			
10.11		BUILDING SEWER				
10.12	6C	(1) Styrene – Rubber	D2852		CS228	
10.13	6C	(2) Polyvinyl Chloride (PVC)	D3034	WW-P-00380a	CSA-B182.2	
10.14			F789			
10.15		(18- to 27-inch only)	F679			
10.16		(18-inch and larger)	F794			
10.17	6C	(3) Acrylonitrile-				
10.18		Butadiene-Styrene (ABS)	D2751		CSA-B182.1	
10.19	6C	(4) Corrugated High Density			4- to 10-inch	
10.20		Polyethylene (Corrugated			AASHTO	
10.21		HDPE) (4- to 60-inch) with			M252	
10.22		ASTM D3212 fittings (Storm			12- to 60-inch	
10.23		only)			ASTM F2306	
10.24		WATER SERVICE - Minimum working pressure rating shall be at least 150 psi for				
10.25		municipal water service and 100 psi for other service.				
10.26	6D	Polyethylene (PE)	B72.1	D2239	LP-315a	NSF14
10.27				D2737	FHA-UM-31C	CS255
10.28						CSA-B137.1

11.1	6E	Acrylonitrile-	B72.3	D2282		NSF14	
11.2		Butadiene-Styrene				CS254	
11.3		(ABS)					
11.4	6F	Polyvinyl Chloride	B72.2	D2241	L-P-1036	NSF14	
11.5		(PVC)		D1785	FHA UM-41	NSF61	
11.6						AWWA	
11.7						C900	
11.8						CS256	
11.9						CSA-B137.3	
11.10	6G	Polybutylene		D2662		NSF14	
11.11				D2666		CSA-B137.7	
11.12	6I	Polyethylene/Aluminum/		F1282		NSF 14	
11.13		Polyethylene				NSF 61	
11.14		(PE-AL-PE)					
11.15		Composite Pressure					
11.16		Pipe (up to 1 inch					
11.17		only)					
11.18		WATER DISTRIBUTION - Polybutylene (PB) systems (PB tubing together with					
11.19		recommended fittings) and chlorinated polyvinyl chloride (CPVC) pipe together with					
11.20		fittings must be tested by the manufacturer at 150 psi and 210 degrees Fahrenheit for a					
11.21		period of not less than 48 hours by a qualified independent testing laboratory acceptable to					
11.22		the administrative authority. Cross-linked polyethylene (PEX) tubing systems together					
11.23		with approved fittings must be tested at 150 psi and 210 degrees Fahrenheit for a period					
11.24		of not less than 30 days by a qualified independent testing laboratory acceptable to the					
11.25		administrative authority.					
11.26		Polypropylene (PP-R) pipe together with fittings must be tested by the manufacturer					
11.27		at 510 psi hoop stress and 203 degrees Fahrenheit for a period of not less than 40 days by					
11.28		a qualified independent testing laboratory acceptable to the administrative authority.					
11.29	6K	Polybutylene		D3309		CSA-B137.8	
11.30						(tubing)	

12.1	6L	Chlorinated	119.1,	D2846	NSF14
12.2		Polyvinyl Chloride	119.2	F441	FHA Bulletin
12.3		(CPVC), Schedule		F442	#76
12.4		80 (2-1/2 to 6 inches)			CSA-B137.6
12.5	6M	Cross-linked		F876	NSF 14
12.6		Polyethylene (PEX)			NSF 61
12.7		Tubing			
12.8	6N	(1) Metal Insert		F1807	NSF 14
12.9		Fittings Utilizing a			NSF 61
12.10		Copper Crimp Ring			
12.11		for PEX Tubing			
12.12	6N	(2) Cold Expansion		F1960	NSF 14
12.13		Fittings with PEX			NSF 61
12.14		Reinforcing Rings			
12.15		for Use with PEX			
12.16		Tubing			
12.17	6N	(3) Cold Expansion		F2080	NSF 14
12.18		Fittings with Metal			NSF 61
12.19		Compressions			
12.20		Sleeves for Use with			
12.21		PEX Tubing			
12.22	6N	(4) Stainless Steel		F2098-01	NSF 14
12.23		Clamps for Securing			NSF 61
12.24		PEX Tubing to Metal			
12.25		Insert Fittings			
12.26	6N	(5) Plastic Insert		F2159	NSF 14
12.27		Fittings Utilizing a			NSF 61
12.28		Copper Crimp Ring			
12.29		for PEX Tubing			

13.1	6N	(6) Cross-linked	F877		NSF 14
13.2		Polyethylene (PEX)			NSF 61
13.3		Plastic Hot and Cold			
13.4		Water Distribution			
13.5		Systems			
13.6	6P	Polypropylene	F2389		NSF 14
13.7		(PP-R)			NSF 61
13.8		SPECIAL WASTES			
13.9	6S	Polyethylene	F1412	LP 315a	PS10-69
13.10					PS11-69
13.11					PS12-69
13.12	6T	Polypropylene	F1412		
13.13	6U	Polyvinylidene	F1673		
13.14		Fluoride (PVDF)			
13.15	6V	Chlorinated			IAPMO IGC
13.16		Polyvinyl Chloride			210-2005a
13.17		(CPVC)			
13.18		GENERAL			
13.19		DRAINAGE			
13.20	6W	Polyethylene	F405		
13.21		(corrugated)			
13.22	VII.	FIBERGLASS PIPE AND FITTINGS			
13.23	7A	Fiberglass pipe (reinforced	D2996		NSF14
13.24		thermosetting resin pipe) (one-			NSF61
13.25		to 16-inch) (18- to 48-inch must			AWWA C-950
13.26		be manufactured in accordance			
13.27		with ASTM D2996)			

13.28 **4715.0510 WATER SERVICE PIPE.**

13.29 The following materials may be used for water service pipe:

14.1 [For text of items A to F, see M.R.]

14.2 G. Plastic pipe 6D, 6E, 6F, 6G, and 6I may be used for water service pipe only
14.3 up to the water meter or pressure tank and provided there is no more than two feet of such
14.4 piping exposed within the building. These materials shall be installed in accordance
14.5 with ASTM D 2774, except that plastic pipe meeting AWWA C900 must be installed
14.6 according to AWWA C605. Particular care shall be taken to avoid sharp edges in contact
14.7 with the pipe and to provide for expansion and contraction. Plastic pipe must be installed
14.8 in accordance with the manufacturer's installation instructions.

14.9 [For text of items H and I, see M.R.]

14.10 **4715.0640 FIXTURE MATERIALS.**

14.11 Plumbing fixtures shall have smooth, impervious surfaces, be free from defects and
14.12 concealed surfaces. All receptacles used as water closets, urinals, or otherwise, for
14.13 the disposal of human excreta, shall be vitreous china, or other material acceptable to
14.14 the administrative authority. Drinking fountains shall be constructed of impervious
14.15 nonoxidizing material and shall be so designed that they may be easily cleaned. Plumbing
14.16 fixtures shall conform to the applicable commercial standards, where such standards exist.

14.17 **4715.0900 FIXTURE TRAP REQUIREMENTS.**

14.18 Each plumbing fixture, except those having an integral trap, shall be separately
14.19 trapped by a water seal trap, installed as close to the fixture as possible, and in such a
14.20 manner as to be accessible for cleaning and repairing.

14.21 A single trap may serve a two or three compartment sink or laundry tray. The trap
14.22 shall be located not more than 30 inches horizontally from each compartment outlet. The
14.23 vertical distance between the fixture outlet and the trap weir shall be as short as possible,
14.24 but in no case more than 24 inches in length.

14.25 No food waste disposal unit shall be installed in a set of restaurant, commercial, or
14.26 industrial sinks, served by a single trap. Each such disposal unit shall be individually
15.1 trapped and connected to a separate waste opening. Each trap shall have the manufacturer's

15.2 name or identification stamped legibly thereon and each tubing trap shall show the gauge
15.3 of the tubing used in its manufacture.

15.4 **4715.1105 GREASE INTERCEPTORS.**

15.5 Subpart 1. **Uniform Plumbing Code (UPC).** For the purposes of this part, "UPC"
15.6 means the 2009 edition of the Uniform Plumbing Code as adopted by the International
15.7 Association of Plumbing and Mechanical Officials (IAPMO), 5001 East Philadelphia
15.8 Street, Ontario, CA 91761. Portions of this part reproduce text and tables from the UPC,
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15.10 UPC is available in the office of the commissioner of labor and industry. The UPC is
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15.12 Subp. 2. **General requirements.** A grease interceptor complying with this part shall
15.13 be installed in waste lines leading from fixtures or equipment in establishments where
15.14 grease may effect line stoppage as determined by the administrative authority. Only
15.15 waste requiring separation may discharge to a grease interceptor. Food waste grinders
15.16 and dishwashers may discharge to a gravity grease interceptor where permitted by the
15.17 manufacturer and the administrative authority.

15.18 Each establishment for which a grease interceptor is required shall have an interceptor
15.19 that serves only that establishment unless otherwise approved by the administrative
15.20 authority. Grease interceptors must be installed in approved locations and must be readily
15.21 accessible for inspection and maintenance. Grease interceptors shall be located as close
15.22 as practical to the fixtures served. Each grease interceptor installation must preclude
15.23 siphoning and provide air relief. Each fixture discharging to a grease interceptor shall be
15.24 trapped and vented according to this chapter.

15.25 A grease interceptor located outside the building that is a part of an individual sewage
15.26 disposal system is not subject to the requirements of this chapter.

16.1 Subp. 3. **Hydromechanical grease interceptors.**

16.2 A. Hydromechanical grease interceptors shall comply with ASME Standard
 16.3 A112.14.3. Plumbing fixtures or equipment connected to a hydromechanical grease
 16.4 interceptor shall discharge through an approved type of flow control installed in a readily
 16.5 accessible and visible location. The total flow through the flow control device shall not
 16.6 be greater than the rated flow of the grease interceptor. No external flow control device
 16.7 having adjustable or removable parts shall be installed. Except for integral flow control
 16.8 devices, each flow control vent shall connect to the plumbing vent system. A vent shall be
 16.9 installed downstream of the grease interceptor according to this chapter.

16.10 B. Hydromechanical grease interceptors shall be sized using one of the
 16.11 following methods.

16.12 (1) When the flow rate of fixtures or appliances are unknown, the grease
 16.13 interceptor shall be sized based on the diameter of the drain discharging to the interceptor
 16.14 according to the following table:

Hydromechanical Interceptor Sizing Using Gravity Flow Rates

	waste pipe diameter, in.	min. interceptor size, gpm
16.18	2	20
16.19	3	75
16.20	4	150
16.21	5	250
16.22	6	500

16.23 (2) Where fixture dimensions and flow rates of all connected fixtures and
 16.24 equipment are known, the interceptor must be sized as follows:

16.25 (a) calculate the volume of each connected fixture;

17.1 (b) multiply the volume of all connected fixtures by a fill factor of 0.75
 17.2 to obtain the discharge volume;

17.3 (c) divide the fixture discharge volume by a drain period of one
17.4 minute; and

17.5 (d) add flow rates of appliances, hydrants, and equipment.

17.6 The minimum grease interceptor size is the sum of all flow rates discharging to the
17.7 interceptor.

17.8 C. Example for sizing using fixture capacity: Two compartments of a sink, a
17.9 hose bibb, and an appliance will discharge to the interceptor.

17.10 (1) Calculate the volume of each fixture.

17.11 $[\text{Length, in.}] \times [\text{Width, in.}] \times [\text{Depth, in.}] / 231 = [\text{Volume, gallons}]$

17.12 $24" \times 24" \times 12" \times 2 \text{ compartments} / 231 = 59.8 \text{ gallons}$

17.13 (2) Calculate the discharge volume of each fixture.

17.14 $[\text{total volume}] \times 0.75 \text{ fill factor} = [\text{discharge volume}]$

17.15 $59.8 \text{ gallons} \times 0.75 = 44.9 \text{ gallons}$

17.16 (3) Calculate the flow rate from each fixture.

17.17 $[\text{discharge volume}] / [1\text{-minute drainage period}] = [\text{flow rate}]$

17.18 $44.9 \text{ gallons} / 1 \text{ minute} = 44.9 \text{ gpm}$

17.19 (4) Add flow rates from appliances, equipment, and hydrants.

17.20 2 compartments of a sink 44.9 gpm

17.21 hose bibb 5 gpm

17.22 appliance 2 gpm

17.23 51.9 gpm

17.24 (5) Minimum interceptor size.

18.1 The interceptor must be rated at 51.9 gpm or greater.

18.2 Subp. 4. **Gravity grease interceptors.** Gravity grease interceptors shall comply with
 18.3 IAPMO/ANSI Standard Z1001 or ASTM Standard C1613. Gravity grease interceptors
 18.4 shall provide for free air circulation through the interceptor and inlet and outlet pipes.
 18.5 Gravity grease interceptors shall be sized by the drainage fixture unit value for all
 18.6 connected fixtures according to the following table.

18.7	Drainage fixture	Interceptor volume,
18.8	units (A,B,C)	gallons
18.9	8	500
18.10	21	750
18.11	35	1,000
18.12	90	1,250
18.13	172	1,500
18.14	216	2,000
18.15	307	2,500
18.16	342	3,000
18.17	428	4,000
18.18	576	5,000
18.19	720	7,500
18.20	2112	10,000
18.21	2640	15,000

18.22 A. The maximum allowable drainage fixture units plumbed to the kitchen drain
 18.23 lines must be connected to the grease interceptor.

18.24 B. When the flow rate of directly connected fixtures or appliances have no
 18.25 assigned drainage fixture unit values, the additional grease interceptor volume shall be
 18.26 based on the known flow rate (gpm) multiplied by 30 minutes.

18.27 C. Drainage fixture unit values must be determined according to part 4715.2300.

19.1 Subp. 5. **Protective treatments.** Grease interceptors constructed of metal, concrete,
19.2 or other materials subject to corrosion shall have protective treatment approved by the
19.3 manufacturer.

19.4 Subp. 6. **Interceptors located outside of buildings.** A grease interceptor outside of
19.5 the building must be installed to be protected from freezing. Buoyancy protection must be
19.6 provided when required by the manufacturer's installation instructions. If installed in a
19.7 nonpaved area, the landscape must be bermed to divert runoff. Accessways for exterior
19.8 grease interceptors must be at least 20 inches square or a diameter to allow adequate
19.9 access to tank interior for inspection and maintenance. Access to the inlet and outlet must
19.10 be provided. The grease interceptor and covers must be protected from loadings that
19.11 may lead to structural collapse and must be designed to withstand any anticipated traffic
19.12 loadings. Exterior grease interceptors to be abandoned are subject to the requirements of
19.13 the Minnesota Pollution Control Agency for abandoning septic tanks.

19.14 Subp. 7. **Labeling.** All grease interceptors must contain a clear and permanent
19.15 product identification label listing the construction standard identified in subpart 3 or 4
19.16 and any additional labeling requirements of that standard.

19.17 Subp. 8. **Testing, maintenance, and records.** Each grease interceptor installation
19.18 must pass a manometer test with one inch of water column for five minutes or a vacuum
19.19 test with two inches of mercury for 60 minutes. Grease interceptors shall be inspected at
19.20 least once every three months and shall be maintained in efficient operating condition by
19.21 periodic removal of the accumulated grease and latent material. Records of inspection
19.22 and maintenance must be kept. The administrative authority shall set the exact frequency,
19.23 duration, and availability of the inspection, cleaning, and record-keeping information.

19.24 **4715.1240 BATHTUBS, WHIRLPOOL BATHTUBS, AND WHIRLPOOL**
19.25 **PEDICURE TUBS.**

20.1 Subpart 1. **General.** All bathtubs, whirlpool bathtubs, and whirlpool pedicure tubs
20.2 must comply with the applicable material product standards. Bathtubs and whirlpool
20.3 bathtubs with pressure-sealed doors must comply with ASME A112.19.15.

20.4 Subp. 1a. **Outlets.** Bathtubs and whirlpool bathtubs must have waste outlets and
20.5 overflows at least one and one-half inches in diameter. The waste control device must be
20.6 located at the tub outlet.

20.7 Subp. 2. **Whirlpool bathtubs.** Whirlpool bathtubs with pumps, air circulation, or
20.8 both must comply with ASME A112.19.7. Pipeless whirlpool bathtubs must comply
20.9 with ASME A112.19.7 or IAPMO IGC 155. All whirlpool bathtub equipment must be
20.10 provided with an access panel.

20.11 Subp. 2a. **Whirlpool pedicure tubs.** Whirlpool pedicure tubs must comply with
20.12 general requirements and water retention sections of ASME A112.19.7 or IAPMO IGC
20.13 155.

20.14 Subp. 3. **Drop-in bathtubs.** Bathtubs which do not have a factory applied flange
20.15 for installation against a wall are considered drop-in-type and must not be installed
20.16 against a wall.

20.17 Subp. 4. **Hot water temperature control device for tubs.** Bathtubs and whirlpool
20.18 tubs must be provided with water temperature limiting devices set at a maximum water
20.19 temperature of 120 degrees Fahrenheit to reduce the risk of scalding, according to ASSE
20.20 Standard 1070.

20.21 **4715.1310 FOOD-WASTE GRINDER UNITS.**

20.22 Domestic food-waste grinders shall be connected to a drain of not less than 1-1/2
20.23 inches in diameter.

20.24 Commercial food-waste grinders shall be connected to a drain of sufficient size to
20.25 serve the unit, but in no case connected to a drain of less than two inches in diameter,
21.1 and shall be connected, trapped, and vented separately from any other fixtures or
21.2 compartments.

21.3 All food-waste grinders shall be provided with an adequate supply of water in
21.4 sufficient flow rate to insure proper functioning of the unit. The water supply line to a
21.5 commercial food waste grinder, which is equipped with a water rinsed funnel, shall be
21.6 protected against back-siphonage by an air gap or vacuum breaker.

21.7 Except as provided in part 4715.1105, no food-waste grinders shall be connected so
21.8 as to discharge through a grease interceptor.

21.9 **4715.1380 SHOWERS.**

21.10 Subpart 1. **Water supply riser.** Every water supply riser from the shower valve to
21.11 the shower head outlet, whether exposed or not, shall be securely attached to the structure.

21.12 [For text of subps 2 to 4, see M.R.]

21.13 Subp. 5. **Anti-scald control devices.** A shower or combination shower-bath in a
21.14 new or remodeled installation must be equipped with an individual shower control valve.
21.15 The valve must be of the thermostatic, pressure-balancing, or combination thermostatic
21.16 and pressure-balancing type in accordance with ASSE Standard 1016.

21.17 The temperature of mixed water to multiple showers must be controlled by either a
21.18 master thermostatic blender that provides scald and thermal shock protection according to
21.19 ASSE 1069, or the showers must be individually equipped with control valves meeting
21.20 ASSE Standard 1016.

21.21 **4715.1410 URINALS.**

21.22 Subpart 1. **Prohibited urinals.** Trough urinals are prohibited.

21.23 [For text of subp 2, see M.R.]

21.24 **4715.1420 WATER CLOSETS.**

22.1 [For text of subps 1 to 3, see M.R.]

22.2 Subp. 4. **Water closet personal hygiene devices.** Water closet personal hygiene
22.3 devices shall conform to ASME Standard A112.4.2.

22.4 **4715.1430 HANGERS AND SUPPORTS.**

22.5 [For text of subps 1 to 3, see M.R.]

22.6 Subp. 4. **Horizontal piping.** Horizontal piping shall be supported at sufficiently
22.7 close intervals to keep it in alignment and prevent sagging:

22.8 A. cast-iron soil pipe, five-foot intervals except where ten-foot lengths of
22.9 cast-iron soil pipe are used, ten-foot intervals between supports are acceptable;

22.10 B. threaded pipe, 12-foot intervals;

22.11 C. copper tubing (1-1/4 inch or less), six-foot intervals;

22.12 D. copper tubing (1-1/2 inch or over), ten-foot intervals;

22.13 E. lead pipe, on continuous metal or wood strips for its entire length;

22.14 F. plastic pipe, 32-inch intervals except where conveying waste from
22.15 dishwashers or similar hot water wastes it shall be supported on continuous metal or
22.16 wood strips for its entire length. CPVC and PP-R nonreinforced water distribution pipe
22.17 (1-1/4 inch or over), four-foot intervals; and

22.18 G. fiberglass reinforced pipe shall be installed with hangers and supports
22.19 according to the manufacturer's installation instructions.

22.20 [For text of subps 5 to 7, see M.R.]

22.21 **4715.1500 INDIRECT WASTE CONNECTIONS.**

22.22 No cold storage room, walk-in cooler or freezer, refrigerator, display cooling case,
22.23 cooling counter, compartment, receptacle, appurtenance, or device, which is used,

22.24 designed, or intended to be used for the storage or holding of food or drink, shall have any
23.1 drain pipe in connection therewith directly connected to any soil, waste, or vent pipe. Such
23.2 equipment shall discharge indirectly to the drainage system according to part 4715.1570
23.3 or 4715.1580. Ice cream dipper wells, ice storage bins, and similar types of receptacles
23.4 shall discharge into the drainage system through an air gap as defined in part 4715.1570.

23.5 The foregoing does not apply to a dishwashing or culinary sink in a food preparation
23.6 room.

23.7 **4715.1530 STERILIZERS.**

23.8 Appliances, devices, equipment, or other apparatus such as stills, sterilizers, and
23.9 similar equipment requiring water and waste shall discharge to the drainage system by
23.10 an air gap.

23.11 **4715.1540 POTABLE CLEAR WATER WASTES.**

23.12 Expansion tanks, cooling jackets, sprinkler systems, water conditioning equipment,
23.13 water heater relief pipes, backflow preventer relief pipes, or any similar devices which
23.14 are directly connected to the potable water system and which waste clear water only shall
23.15 be discharged to the drainage system through an air gap.

23.16 **4715.1590 RECEPTORS OR SUMPS.**

23.17 Subpart 1. **Installment.** Except for clothes washers located in bathrooms of
23.18 single-family dwellings or private use living units, waste receptors or sumps receiving
23.19 the indirect waste shall not be installed in any toilet room, nor in an inaccessible or
23.20 unventilated space.

23.21 [For text of subps 2 and 3, see M.R.]

23.22 Subp. 4. **Stand pipe receptors.** Stand pipe receptors shall be individually trapped
23.23 and vented according to the requirements of this chapter. Each stand pipe receptor for
23.24 clothes washers shall meet this requirement, except that multiple clothes washers in the
23.25 same room may discharge to multiple standpipes that are manifolded together with a

24.1 single trap. The stand pipe receptor for clothes washers shall extend not more than 30
24.2 inches, nor less than 18 inches above its trap, and the trap shall be installed at least six
24.3 inches above the floor.

24.4 Subp. 5. [Repealed, 19 SR 590]

24.5 **4715.2100 BACKFLOW PREVENTERS.**

24.6 A. Atmospheric vacuum breaker (AVB):

24.7 (1) must be installed at least six inches above spill line (see special
24.8 requirements in part 4715.2150);

24.9 (2) no possibility of back pressure permitted;

24.10 (3) only permitted on discharge side of last control valve;

24.11 (4) no more than eight hours of continuous line pressure permitted; and

24.12 (5) must be listed to ASSE Standard 1001.

24.13 B. Pressure vacuum breaker assembly (PVB):

24.14 (1) must be installed at least 12 inches above spill line;

24.15 (2) no possibility of back pressure permitted;

24.16 (3) continuous line pressure permitted; and

24.17 (4) must be listed to ASSE Standard 1020.

24.18 C. Spill-proof vacuum breaker (SVB):

24.19 (1) must be installed at least 12 inches above spill line;

24.20 (2) no possibility of back pressure permitted;

24.21 (3) continuous line pressure permitted;

24.22 (4) field testable; and

- 25.1 (5) must be listed to ASSE Standard 1056.
- 25.2 D. Hose connection vacuum breaker (Hose VB):
- 25.3 (1) required for threaded hose connections;
- 25.4 (2) back pressure not permitted;
- 25.5 (3) continuous line pressure not permitted;
- 25.6 (4) any new device must be field testable. Exception: a vacuum breaker
- 25.7 installed as an integral part of a product, approved to ASSE Standard 1011, and installed
- 25.8 at the factory will not be required to be field testable; and
- 25.9 (5) must be listed to ASSE Standard 1052. Wall hydrant vacuum breaker
- 25.10 must be listed to ASSE Standard 1019.
- 25.11 E. Double-check valve with intermediate atmospheric vent (DCVIAV):
- 25.12 (1) permitted for low hazard with small pipe sizes;
- 25.13 (2) back pressure permitted;
- 25.14 (3) continuous line pressure permitted;
- 25.15 (4) must be listed to ASSE Standard 1012; and
- 25.16 (5) device for beverage dispensing equipment must be listed to ASSE
- 25.17 Standard 1022. For carbonated beverage machines, the additional requirements in part
- 25.18 4715.2163 apply.
- 25.19 F. Reduced pressure zone backflow preventer assembly (RPZ):
- 25.20 (1) any degree of hazard permitted;
- 25.21 (2) back pressure permitted;
- 25.22 (3) continuous line pressure permitted;
- 25.23 (4) must be listed to ASSE Standard 1013; and

26.1 (5) fire sprinkler system backflow preventer must be listed to ASSE
 26.2 Standard 1013 or 1047.

26.3 G. Double-check valve assembly (DCVA):

26.4 (1) permitted only for nontoxic, low hazard installations with nuisance or
 26.5 aesthetic concern;

26.6 (2) back pressure permitted;

26.7 (3) continuous line pressure permitted;

26.8 (4) must be listed to ASSE Standard 1015; and

26.9 (5) fire sprinkler systems must be listed to ASSE Standard 1015 or 1048.

26.10 H. Deck-mounted and equipment-mounted vacuum breakers and faucets with
 26.11 integral atmospheric or spill-proof vacuum breakers shall be installed according to the
 26.12 manufacturer's instructions with the critical level not less than one inch (25 mm) above the
 26.13 flood level rim. The vacuum breaker device must comply with ASSE Standard 1001.

26.14 **4715.2110 TYPES OF DEVICES REQUIRED WHERE AN AIR GAP CANNOT**
 26.15 **BE PROVIDED.¹**

26.16		Where back pressure is	Only allowed where no
26.17		possible	back pressure is possible
26.18		DCV	SVB or Hose
26.19	RPZ	IAV DCVA	PVB AVB VB
26.20			(control (no (no
26.21			valve control control
26.22			may be valve valve
26.23			down- down- down-
26.24		(low (low	stream stream stream
26.25		(any hazard hazard	of of of
26.26		hazard) only) only)	device) device) device)
26.27	A. Boiler, other than one- or		
26.28	two-family residential	X	

27.1	B.	Boiler, one- or two-family					
27.2		residential	X	X			
27.3	C.	Car wash	X			X	X
27.4	D.	Carbonated beverage					
27.5		machine (postmix) (see					
27.6		part 4715.2163)		X			
27.7	E.	Chemical line	X				
27.8	F.	Chemical tank	X			X	X
27.9	G.	Chiller	X				
27.10	H.	Cooling tower	X			X	X
27.11	I.	Dental units (separate					
27.12		assembly required for each					
27.13		unit) ²	X				
27.14	J.	Dishwasher, commercial				X	X
27.15	K.	Fire sprinkler system ³	X		X		
27.16	L.	Flush tank (water closet,					
27.17		urinal, similar) (see part					
27.18		4715.2150)	X			X	X
27.19	M.	Flush valve (water closet,					
27.20		urinal, similar) (see part					
27.21		4715.2150)	X			X	X
27.22	N.	Food and beverage					
27.23		equipment or system	X	X	X	X	X
27.24	O.	Garbage can washer	X			X	X
27.25	P.	Glycol or other antifreeze					
27.26		system	X				
27.27	Q.	Lab equipment	X			X	X
27.28	R.	Lab faucet					X
27.29	S.	Laundry machine,					
27.30		commercial	X			X	X
27.31	T.	Lawn, garden, or					
27.32		greenhouse sprinkler					
27.33		system	X			X	X

28.1	U.	Operating, dissection,				
28.2		embalming, or mortuary				
28.3		table (see part 4715.1950)	X		X	X
28.4	V.	Private potable water				
28.5		supply (where permitted by				
28.6		administrative authority)	X	X	X	
28.7	W.	Private nonpotable water				
28.8		supply (where permitted by				
28.9		administrative authority)	X			
28.10	X.	Process line	X			
28.11	Y.	Process tank	X		X	X
28.12	Z.	RV dump station	X		X	X
28.13	AA.	Sewage treatment	X		X	X
28.14	BB.	Soap dispenser (see part				
28.15		4715.2165)	X		X	X
28.16	CC.	Swimming pool, fountain,				
28.17		pond, baptistry, aquarium				
28.18		or similar	X		X	X
28.19	DD.	Threaded hose				
28.20		connections, including:				
28.21		hose bibbs, hydrants,				
28.22		service sinks, laundry trays			X	X
28.23	EE.	Truck fill	X		X	X
28.24	FF.	Vacuum systems or				
28.25		aspirators	X		X	X
28.26	1. For installations not listed in this part, review with the Administrative Authority.					
28.27	2. If a dental water treatment system that has been cleared by the Food and Drug					
28.28	Administration (FDA) for marketing is to be installed, a single RPZ device shall be					
28.29	installed upstream of the dental water treatment system and not required on each					
28.30	branch line. The system shall be installed and maintained according to the treatment					
28.31	system manufacturer's instructions. Water lines of less than one-half inch are permitted					
28.32	downstream of the water treatment system when required by the manufacturer.					

29.1 3. Installations must comply with AWWA-M14, chapter 6 (1990) except that the following
 29.2 statement is deleted from section 6.3: At any time where the fire sprinkler piping is not an
 29.3 acceptable potable water system material, there shall be a backflow-prevention assembly
 29.4 isolating the fire sprinkler system from the potable water system.

29.5 4. A vacuum breaker installed as an integral part of a product approved to a standard
 29.6 does not require additional backflow prevention on the hose threads; the product must be
 29.7 constructed so that if the integral backflow preventer is removed, the remaining threads
 29.8 will not be hose thread type. An unprotected threaded hose connection must be protected
 29.9 against backflow by addition of a backflow preventer complying with ASSE 1052.

29.10 **4715.2150 CONNECTIONS NOT SUBJECT TO BACK PRESSURE.**

29.11 [For text of subp 1, see M.R.]

29.12 Subp. 2. **Cross-connections where protective devices are required and critical**
 29.13 **level (C-L) settings for backflow preventers.** Critical level (C-L) is defined as the level
 29.14 to which the backflow preventer (vacuum breaker) may be submerged before backflow
 29.15 will occur. Where the C-L is not shown on the preventer, the bottom of the device shall
 29.16 be taken as the C-L.

29.17	Fixture or Equipment	Method of Installation
29.18	Aspirators and Ejectors	C-L at least 6 inches above flood level of
29.19		receptacle.
29.20	Dental units	On models without built-in vacuum breakers C-L
29.21		at least 6 inches above flood level rim of bowl.
29.22	Dishwashing machines	C-L at least 6 inches above flood level of machine.
29.23		Install on both hot and cold water supply lines.
29.24	Flushometer (Closet & Urinal)	C-L at least 6 inches above top of fixture supplied.
29.25	Garbage can cleaning machine	C-L at least 6 inches above flood level of machine.
29.26		Install on both hot and cold water supply lines.
29.27	Hose outlets	C-L at least 6 inches above highest point on hose
29.28		line.

30.1	Laundry machines	C-L at least 6 inches above flood level of machine.
30.2		Install on both hot and cold water supply lines.
30.3	Lawn sprinklers	C-L at least 12 inches above highest sprinkler or
30.4		discharge outlet.
30.5	Steam tables	C-L at least 6 inches above flood level.
30.6	Tank and vats	C-L at least 6 inches above flood level rim or line.
30.7	Flush tanks	Equip with approved ball cock. Where ball cocks
30.8		touch tank water equip with vacuum breaker with
30.9		C-L at least 1 inch above overflow outlets. Where
30.10		ball cock does not touch tank water, install ball
30.11		cock outlet at least 1 inch above overflow outlet or
30.12		provide vacuum breaker as specified above.
30.13	Hose bibbs (Where aspirators or	C-L at least 6 inches above flood level of receptacle
30.14	ejectors could be connected)	served.

30.15 **4715.2300 LOAD ON DRAINAGE PIPING.**

30.16 [For text of subps 1 to 2a, see M.R.]

30.17 **Subp. 3. Table of fixture unit values for various plumbing fixtures.**

30.18			Minimum
30.19			Fixture
30.20			and Trap
30.21		Fixture Unit	Drain
30.22	Type of Fixture	Value	Size
30.23	Clothes washer (domestic use)	2	1-1/2
30.24	Clothes washer (single unit, discharge to standpipe)	2	2
30.25	Clothes washer (public use in groups of 3 or more)	6 each	
30.26	Bath tub with or without shower	2	1-1/2
30.27	Bidet	2	1-1/2
30.28	Dental unit or cuspidor	1	1-1/4
30.29	Drinking fountain	1	1-1/4
30.30	Dishwasher, domestic	2	1-1/2
30.31	Dishwasher, commercial	4	2

31.1	Floor drain with 2 inch waste	2	2
31.2	Floor drain with 3 inch waste	3	3
31.3	Floor drain with 4 inch waste	4	4
31.4	Lavatory (single) or hand sink	1	1-1/4
31.5	Laundry tray (1 or 2 compartment)	2	1-1/2
31.6	Shower stall, domestic	2	1-1/2
31.7	Shower (gang) per head	1	
31.8	SINKS:		
31.9	Classroom, with or without drinking fountain	2	1-1/2
31.10	Domestic, with disposal unit and/or dishwasher	2	1-1/2
31.11	Surgeons	3	1-1/2
31.12	Laboratory cup sink	1	1-1/2
31.13	Flushrim or bedpan washer	6	3
31.14	Service	3	2
31.15	Pot or scullery	4	2
31.16	Soda fountain	2	1-1/2
31.17	Commercial (flat rim, bar, food prep, or counter sink)	3	1-1/2
31.18	Commercial (food-waste grinder or food prep sink with grinder)	4	2
31.19	Wash, circular, or multiple (per set of faucets)	2	1-1/2
31.20	URINAL pedestal, wall hung, with 3 inch trap (blowout and		
31.21	syphon jet)	6	3
31.22	Wall hung with 2 inch trap	3	2
31.23	Wall hung with 1-1/2 inch trap	2	1-1/2
31.24	Stall	3	2
31.25	WATER CLOSET	6	3
31.26	Unlisted Fixture or Trap Size		
31.27	1-1/4 inch	1	
31.28	1-1/2 inch	2	
31.29	2 inch	3	
31.30	2-1/2 inch	4	

- 32.1 3 inch 5
- 32.2 4 inch 6

32.3 **4715.2350 MINIMUM SIZE OF UNDERGROUND GRAVITY DRAINS.**

32.4 No portion of the gravity drainage system installed underground shall be less than
32.5 two inches in diameter.

32.6 **4715.2420 PROHIBITED FITTINGS AND CONNECTIONS.**

32.7 Subpart 1. **General prohibitions.** No fittings having a hub in the direction opposite
 32.8 to flow, or straight tee branch shall be used as a drainage fitting. No fitting or connection
 32.9 which has an enlargement chamber or recess with a ledge or shoulder, or reduction in pipe
 32.10 area shall be used. No manhole shall be used to join drainage piping within a building.
 32.11 No drainage or vent piping shall be drilled, tapped, or welded unless otherwise permitted
 32.12 by the administrative authority. Fittings used for back-to-back, wall outlet, blowout type
 32.13 water closet bowls shall have a baffle plate or other device to prevent the waste water
 32.14 from one water closet from entering the opposite water closet. No fixture or cleanout
 32.15 connection shall be made to a closet bend. No running threads, bands, or saddles shall be
 32.16 used. The short pattern fitting in a horizontal position is prohibited in underground work.

32.17 [For text of subps 2 to 4, see M.R.]

32.18 **4715.2440 DESIGN OF SUMPS.**

32.19 [For text of subp 1, see M.R.]

32.20 Subp. 2. **Discharge line.** The discharge line from such pumping equipment shall be
 32.21 provided with an accessible backwater valve and gate or full port ball valve, and if the
 32.22 gravity drainage line to which such discharge line connects is horizontal, the method of
 32.23 connection shall be from the top through a wye branch fitting. Except for grinder pumps
 32.24 and as provided in part 4715.2450, the minimum size of any pump or discharge pipe
 32.25 from a sump having a water closet connected thereto shall not be less than two inches.

33.1 The grinder pump and its discharge line shall be a minimum of 1-1/4 inches in size. The
33.2 calculated velocity in any sump discharge line shall not be less than two feet per second.

33.3 Subp. 3. **Sumps for buildings.** Building drains or building sewers receiving
33.4 discharge from any pumping equipment shall be adequately sized to prevent overloading.
33.5 In all buildings, other than single- and two-family dwellings, should three or more water
33.6 closets discharge into the sump, duplicate pumping equipment shall be installed with
33.7 controls that alternate the operation of each pump under normal conditions.

33.8 [For text of subp 4, see M.R.]

33.9 Subp. 5. **Capacity.** In a single-family dwelling, the minimum storage capacity from
33.10 the pump suction inlet to the alarm level of a sump other than a macerating toilet system is
33.11 18 gallons. For all facilities, the sump basin storage volume and the pump capacity shall be
33.12 adequate to prevent overloading and shall minimally meet the requirements in this subpart.

33.13 A. The pump and sump basin shall be able to accommodate the peak flow into
33.14 the sump for a duration of five minutes.

33.15 B. The peak flow into the sump shall be approximated by calculating the peak
33.16 water supply demand for the fixtures discharging to the sump as determined in part
33.17 4715.3700, and adding any flows from tanks or other equipment based on the maximum
33.18 flow rates from the equipment. The maximum liquid level in the sump shall be calculated
33.19 with the peak flow beginning at the highest design liquid level in the sump under normal
33.20 operating conditions with one pump operating.

33.21 C. The calculated maximum liquid level in the sump must be less than the alarm
33.22 level and must be below the sump inlet.

33.23 [For text of subps 6 and 7, see M.R.]

33.24 **4715.2450 MACERATING TOILET SYSTEMS.**

34.1 Subpart 1. **Macerating toilet systems.** Macerating toilet systems shall comply with
34.2 ASME A112.3.4 and shall be installed according to the manufacturer's recommendations.

34.3 Subp. 2. **Location.** A macerating toilet system may only be installed in one- or
34.4 two-family dwellings when gravity flow is not possible. Not more than one bathroom
34.5 group, consisting of a toilet, a lavatory, and a shower or bathtub, may discharge into a
34.6 macerating toilet system. Components of macerating toilet systems shall be accessible.

34.7 Subp. 3. **Discharge line.** The discharge line of a macerating toilet system shall not
34.8 be less than three-fourths inch.

34.9 Subp. 4. **Sump vent.** If the macerating toilet system's vent connection is less than
34.10 two inches, the vent shall transition to a minimum of two inches immediately after the
34.11 connection to the system.

34.12 **4715.2550 WET VENTING.**

34.13 [For text of subps 1 to 3, see M.R.]

34.14 Subp. 4. **Water closet.** A lavatory may be connected to a properly installed vent
34.15 from a floor-set water closet.

34.16 **4715.2790 SIPHONIC ROOF DRAINAGE SYSTEM.**

34.17 Subpart 1. **General requirements.** In lieu of sizing the storm drainage system from
34.18 conventional methods as required in part 4715.2710, the roof drainage may be designed
34.19 as an engineered siphonic roof drainage system when allowed by the administrative
34.20 authority. The engineered siphonic roof drainage system must meet the requirements
34.21 of subparts 2 and 3.

34.22 Subp. 2. **Design criteria.** The siphonic roof drainage system must be designed and
34.23 certified by a professional engineer licensed in the state of Minnesota.

- 35.1 A. The system must be sized on the basis of a minimum rate of rainfall of
35.2 four inches per hour.
- 35.3 B. The drainage system must be designed according to ASPE Standard 45,
35.4 Siphonic Roof Drainage, and according to the manufacturer's recommendations and
35.5 requirements. Manufacturer design software must be in accordance with ASPE Standard
35.6 45.
- 35.7 C. Roof drains must meet ASME A112.6.9, Siphonic Roof Drains.
- 35.8 D. When designed for water accumulation, the roof must be designed for the
35.9 maximum possible water accumulation according to chapter 1305 and part 4715.2780,
35.10 subpart 1, item C.
- 35.11 E. Minimum pipe size must be 1-1/2 inches. All pipe sizes and cleanouts in the
35.12 drainage system must be designed and installed according to ASPE Standard 45.
- 35.13 F. Horizontal pipe size must not reduce in the direction of flow.
- 35.14 G. The plans and specifications for the drainage system shall indicate the
35.15 siphonic roof drainage system as an engineered method used for the design.
- 35.16 H. The installed drainage system must be permanently and continuously marked
35.17 as a siphonic roof drainage system at approved intervals and clearly at points where piping
35.18 passes through walls and floors. Roof drains must be marked in accordance with ASME
35.19 A112.6.9.
- 35.20 I. The transition locations from the siphonic roof drainage system to a gravity
35.21 system must be determined by the design engineer at a location acceptable to the
35.22 administrative authority. The design, sizing, and venting of the transition location must be
35.23 in accordance with ASPE Standard 45. The velocity at the transition location to gravity
35.24 shall be reduced to less than three feet per second. The gravity portion of the building
35.25 storm sewer system receiving the siphonic roof drainage system must be sized for the

36.1 design rate but no less than a rainfall rate of four inches per hour and in accordance with
36.2 part 4715.2710.

36.3 J. All plans, specifications, and calculations must be submitted to the
36.4 administrative authority and signed and sealed by the design engineer. The submitted
36.5 calculations must include performance data for the drainage system for the required
36.6 rainfall rate, including the minimum and maximum calculated operating pressures and
36.7 velocities verifying that the design solution is within the operating parameters required by
36.8 the design standard. All performance data must be reported as the extreme maximum and
36.9 minimum calculations and shall not be presented with "averaged" data.

36.10 Subp. 3. **Proof of suitability.** Upon completion of the project, proper tests,
36.11 inspections, and certification of the siphonic roof drainage system must be performed
36.12 according to items A and B.

36.13 A. Testing must be performed according to ASPE Standard 45.

36.14 B. Prior to the final plumbing inspection, the design engineer must provide
36.15 written certification to the administrative authority that the system has been visually
36.16 inspected by the design engineer and the installation has been properly implemented
36.17 according to the certified design, plans, calculations, and specifications. The submitted
36.18 written certification must include any field modification from the initial design involving
36.19 dimensions, location, or routing of the siphonic drainage system that must be reapproved
36.20 and recertified by the design engineer and be accompanied by a final as-built design
36.21 of the altered system and supported by calculated data to show that the overall system
36.22 remains in accordance with ASPE Standard 45.

36.23 **4715.2820 METHOD OF TESTING.**

36.24 [For text of subp 1, see M.R.]

37.1 Subp. 2. **Rough plumbing.** The piping of plumbing drainage and venting systems
37.2 shall be tested upon completion of the rough piping. The method of testing shall be
37.3 specified by the designer and shall either be an air test or hydrostatic test as described in
37.4 this subpart or an alternative test as approved by the administrative authority. The air test
37.5 shall be made by attaching the air compressor or testing apparatus to any suitable opening
37.6 and closing all other inlets and outlets to the system by means of proper testing plugs.
37.7 Plaster of paris shall not be used in roof terminals. Air shall be forced into the system until
37.8 there is a uniform pressure of five pounds per square inch on the portion of the system
37.9 being tested. The pressure shall remain constant for 15 minutes without the addition of
37.10 air. The pressure gauge scale shall not read more than 30 pounds per square inch and the
37.11 gauge face shall not be less than 2-1/2 inches in diameter.

37.12 The hydrostatic test for thermoplastic piping materials shall be conducted by tightly
37.13 closing all openings in the entire system to be tested except the highest opening. The
37.14 system shall be filled with water to the point of overflow. If the system is tested in
37.15 sections, each opening shall be tightly plugged except the highest opening of the section
37.16 under test. Each section shall be filled with water, but a section shall not be tested with
37.17 less than ten foot head of water. In testing successive sections, at least the upper ten feet of
37.18 the next preceding section shall be tested, so that no joint or pipe in the building, except
37.19 the uppermost ten feet of the system, is subjected to a test of less than ten foot head of
37.20 water. The water shall be kept in the system or in the portion under test for at least 15
37.21 minutes before inspection begins. The system shall be tight at all points.

37.22 In lieu of five pound air test, concrete manholes and sewer lines may be tested by
37.23 negative pressure in accordance with ASTM Standards C1214-92 and C1244-93.

37.24 Subp. 2a. **Exceptions.**

37.25 [For text of item A, see M.R.]

38.1 B. Building storm sewers may be tested in accordance with the Hydrostatic Test
38.2 Method from the City Engineers Association of Minnesota, except that an air test may be
38.3 required for any section of the building storm sewer that passes through contaminated
38.4 soils or contaminated water. The Hydrostatic Test Method, provisions F2 and F3, as
38.5 specified in Standard Utilities Specifications for Watermain and Service Line Installation
38.6 and Sanitary Sewer and Storm Sewer Installation, written and published by the City
38.7 Engineers Association of Minnesota, 1999 edition, is incorporated by reference, is not
38.8 subject to frequent change, and is available in the office of the commissioner.

38.9 Subp. 3. **Finished plumbing.** After the plumbing fixtures have been set and their
38.10 traps filled with water, their connections shall be tested and proven gas and water tight by
38.11 plugging the stack openings on the roof and the building drain where it leaves the building,
38.12 and air introduced into the system equal to the pressure of a one inch water column. Such
38.13 pressure shall remain constant for 15 minutes or the duration of the inspection without
38.14 the introduction of additional air.

38.15 [For text of subps 4 to 7, see M.R.]

38.16 **REPEALER.** Minnesota Rules, parts 4715.1110; and 4715.1115, are repealed.

38.17 **EFFECTIVE DATE.** The amendments to these rules are effective 180 days after filing
38.18 with the secretary of state or five working days after publication of the notice of adoption
38.19 in the State Register, whichever occurs later.