ERRATA TO THE
2000 INTERNATIONAL PLUMBING CODE

Fifth Printing, August, 2003

(Updated December 17, 2003)

Table 702.2 Underground Building Drainage and Vent Pipe. Revise as follows:
Row 7, Column 2 now reads....ASTM F 891; ASTM F 1488

Fourth Printing, October 2002

101.2 Scope. Add exception: Detached one-and two family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code.*

101.2 Scope. Add last sentence. Provisions in the appendices shall not apply unless specifically adopted.

413.1 Approval. Delete .73 from ASSE 1008.

Table 702.3 Building Sewer Pipe. Under Polyvinyl chloride (PVC) plastic pipe change reference standard CSA B182.2 to CSA CAN/CSA B182.2 and under Concrete pipe change reference standard CSA A257.1 to CSA CAN/CSA A257.1.

705.5.3 Mechanical joint coupling. Delete M from CSA CAN/CSA B602.

705.6 Concrete joints. Change reference standard CSA A257.3 to CSA CAN/CSA A257.3M.

705.7.2 Solvent cementing. Change reference standard CSA CAN/CSA B181.1 to CSA B181.1.

705.8.2 Solvent cementing. Change reference standards CSA CAN/CSA B137.3 to CSA B137.3, CSA CAN/CSA B181.2 to CSA B181.2 and CSA CAN/CSA B182.1 to CSA B182.1.

705.14.2 Solvent cementing. Change reference standards CSA CAN/CSA B137.3 to CSA B137.3, CSA CAN/CSA B181.2 to CSA B181.2 and CSA CAN/CSA B182.1 to CSA B182.1.

705.16 Joints between different materials. Delete M from CSA CAN/CSA B602 and add CSA to CAN/CSA A257.3M.

715.2 Material. Delete CAN/CSA from reference standards CSA B181.1 and CSA B181.2.

Table 1102.4 Building Storm Sewer Pipe. Under Polyvinyl chloride (PVC) plastic pipe change reference standard CSA B182.2 to CSA CAN/CSA B182.2 and under Concrete pipe change reference standard CSA A257.1 to CSA CAN/CSA A257.1.

Table 1102.5 Subsoil Drain Pipe. Under Polyvinyl chloride (PVC) plastic pipe change reference standard CSA B182.2 to CSA CAN/CSA B182.2

Chapter 13

Referenced Standards

NSF

14-98 Add reference section 611.3.
42-98 Add reference section 611.3.
44-98 Add reference section 611.3.
53-98 Add reference section 611.3.
61-99 Add reference section 611.3.

CSA

CAN/CSA B64.3-94 Delete reference section 608.13.2.
CAN/CSA B64.4-94 Add reference section 608.13.2.

Appendix D Table D101. Add a terminal zero to every entry in the last column for states AL through OH.

Third Printing, January 2002

Table 308.5 Hanger Spacing. Revise as follows:
Delete footnote "a" from piping material Cast-iron pipe.
Add footnote "a" under the column for maximum horizontal spacing for Cast-iron pipe.

405.8 Access to concealed connections. Revise as follows:
Change title to: "Slip joint connections."
Add the 1st sentence:
"Slip joints shall be made with an approved elastomeric gasket
and shall only be installed on the trap outlet, trap inlet and within the trap seal."

424.2 Flushometer valves and tanks. Revise as follows:
Relocate Section 424.2 to Section 425.2**.**
Delete 1st sentence:
"Slip joints shall be made with an approved elastomeric gasket
and shall only be installed on the trap outlet, trap inlet and within the trap seal."

607.2.1 Piping insulation. Revise as follows:
In the exception change (14EC) to(-3.9EC)

705.17 Drainage slip joints. Revise as follows:
Change reference from Section 424.2 to 405.8.

1201.1 Scope. Revise as follows:
In 2nd sentence: Change reference from International Building Code
to International Fire Code.

REFERENCED STANDARDS

ASSE:

1055-98 Revise title from Performance Requirements for Backflow Devices for Chemical Dispersons to "Performance Requirements for Backflow Devices for Chemical Dispensing Systems."

CSA:

B125-94 Change section references from 425.4.1 and 425.5 to 423.2.1 and 425.3 .

Appendix C 301.3 Connections to drainage system. Revise as follows:
1st sentence Delete: "properly". Add "directly" before " connected to the drainage system."
2nd sentence: Delete: "provided for in" and replace with "required by."

Second Printing, January 2001

(Also see Third Printing)

202 Definitions Revise as follows:
Delete Type A Dwelling Unit and Type B Dwelling Unit.

Table 403.1 Minimum Number of Plumbing Facilities Revise as follows:
In Occupancy column, for Mercantile:
Change referenced sections from "403.4 and 403.5" to "403.4 and 403.6".

403.4 Location of employee toilet facilities in occupancies other than assembly or mercantile. Revise as follows:
In 4th line: Delete the word "regular" after employee's
In 6th line: Delete the word "customer" after public
Exception, in last line: Delete the word "regular" after employee's

403.4.1 Travel distance. Revise as follows:
In 3rd line: Delete the word "regular" after employee's

403.5 Location of employee toilet facilities in mercantile and assembly occupancies. Revise as follows:
In 6th line: Delete the word "customer" after public
In 8th line: Delete the word "regular" after employee's

425.2 Flushometer valves and tanks Revise as follows:
Relocate Section 425.2 to 424.2 and change title to: "Slip joint connections."
And renumber remaining section of Section 424.
Add the 1st sentence:
"Slip joints shall be made with an approved elastomeric gasket and shall only be installed on the trap outlet, trap in let and within the trap seal."

Table 605.6 Pipe Fittings Revise as follows:
In 2nd column, 4th row: Delete "ASTM B16.32"

Table 702.4 Pipe Fittings Revise as follows:
In 2nd column, 7th row: Delete "ASTM B16.32"

705.17 Drainage slip joints. Revise as follows:
Change referenced section from "405.8" to "424.2".

901.2 Trap seal protection. Revise as follows:
In last line: "...than 1 inch of water column (249 Pa)."

903.1.1 Connection to drainage system. Revise as follows:

In 1st line, Delete: "A main vent that is".
In 3rd line, Delete: ".. main vent that is."

904.2 Frost closure. Revise as follows:
In 2nd line, Delete: "... less than" and add "0 F (-18 C) or less, ..."

Table 1102.7 Pipe Fitting Revise as follows:
In 2nd column, 4th row: Delete "ASTM B16.32"

Table 1106.3 Size of Vertical Conductors and Leaders Revise as follows:
In Rainfall rate, 4" column: Change "1800" to "1880".

REFERENCE STANDARDS Revise as follows"

ANSI Change address to read: 25 West 43th Street, Fourth Floor
New York, NY 10036

ASME Delete: "B16.32-92 Cast Copper"

ASSE Change reference number "1008.73–89" to "1008–89"

CSA In title: Change "PBX" to "PEX"

APPENDIX E

E102.2.2: In 3rd line: "...for fixtures (see Table E102)"

E103.2.1: Delete and Substitute as follows:
"**E103.2 Pipe sizing.** Pipe sizes can be selected according to the Following procedure or by other design methods conforming to acceptable engineering practice, approved by the administrative authority, and that the sizes selected shall not be less than the minimum required by this code."

E103.2.2: Revise as follows:
In 1st line, revise sentence to read:
"Water pipe sizing procedure are based ....."
In example, below Item 2: "..... differential of 20 feet by 0.433 psi/per foot...".
Item 4: Delete, "(see Table E103A)".
Item 6: Delete, "(see Tables E103B and E103C)".
Item 7: Delete 3rd sentence, "When using charts, use pipe inside diameter".

Add: "**Note:** For the purposes of all examples, the following metric conversions are applicable".

1 cfm	=	0.4719 L/s
1 square foot	=	0.0929 m^2
1 degree	=	0.0175 rad
1 psi	=	6.895 kPa
1 inch	=	25.4 mm
1 foot	=	304.8 mm

1 gpm = 3.785 L/m

E103.3 Example. Delete and Substitute as follows:

E103.3 Segmented Loss method.

The size of water service mains, branch mains and risers shall be determined according to water supply demand [gpm (L/m)], available water pressure [psi (kPa)] and friction loss due to the water meter and developed length of pipe [feet (m)], including equivalent length of fittings. This design procedure is based on the following parameters:

- Calculates the friction loss through each length of the pipe.

- Based on a system of pressure losses, the sum of which must not exceed the minimum pressure available at the street main or other source of supply.

- Pipe sizing based on estimated peak demand, total pressure losses due to difference in elevation, equipment, developed length and pressure required at most remote fixture, loss through taps in water main, losses through fittings, filters, backflow preventers, valves, and pipe friction.

Because of the variable conditions encountered in hydraulic design, it is impractical to specify definite and detailed rules for sizing of the water piping system. Accordingly, other sizing or design methods conforming to good engineering practices are acceptable alternates to that presented herein. Current sizing methods do not address the differences in the probability of use and flow characteristics of fixtures between types of occupancies. Creating an exact model of predicting the demand for a building is impossible and final studies assessing the impact of water conservation on demand are not yet complete.

1. **Preliminary.** Obtain the necessary information regarding the minimum daily static service pressure in the area where the building is to be located. If the building supply is to be metered, obtain information regarding friction loss relative to the rate of flow for meters in the range of sizes likely to be used. Friction loss data can be obtained from most manufacturers of water meters. It is essential that enough pressure be available to overcome all system losses due to friction and elevation so that plumbing fixtures operate properly. Section 604.6 requires the water distribution system to be designed for the minimum pressure available taking into consideration pressure fluctuations. The lowest pressure must be selected to guarantee a continuous, adequate supply of water. The lowest pressure in the public main usually occurs in the summer due to lawn sprinkling and supplying water for air conditioning cooling towers. Future demands placed on the public main as a result of large growth or expansion should also be considered. The available pressure will decrease as additional loads are placed on the public system.

2. **Demand Load.** Estimate the supply demand of the building main and the principal branches and risers of the system by totaling the corresponding demand from the applicable part of Table E102. When estimating peak demand sizing methods typically use water supply fixture units (w.s.f.u.). This numerical factor measures the load-producing effect of a single plumbing fixture of a given kind. The use of such fixture units can be applied to a single basic probability curve (or table), found in the various sizing methods (such as Table E102). The fixture units are then converted into gallons per minute flow rate for estimating demand.

    a) Estimate continuous supply demand in gallons per minute for lawn sprinklers, air conditioners, etc., and add the sum to the total demand for fixtures. The result is the estimated supply demand for the building supply. Fixture units cannot be applied to constant use fixtures such as hose bibbs or continuous supply systems such as lawn sprinklers and air conditioners. These types of fixtures must be assigned the gallon per minute (g.p.m.) value.

3. **Selection of pipe size.** This water pipe sizing procedure is based on a system of pressure requirements and losses, the sum of which must not exceed the minimum pressure available at the supply source. These pressures are as

follows:

1. Pressure required at the fixture to produce required flow. See Section 604.3 and Section 604.5.
2. Static pressure loss or gain (due to head) is computed at 0.433 psi per foot (9.8 kPa/m) of elevation change.
3. Loss through a water meter. The friction or pressure loss can be obtained from meter manufacturers.
4. Loss through taps in water main. See Table E103A.
5. Losses through special devices such as filters, softeners, backflow preventers and pressure regulators. These values must be obtained from the manufacturers.
6. Loss through valves and fittings, see Tables E103B and E103C. Losses for these items are calculated by converting to equivalent length of piping and adding to the total pipe length.
7. Loss due to pipe friction can be calculated when the pipe size, the pipe length and the flow through the pipe are known. With these three items, the friction loss can be determined using Figures E103A.1 through E103D. When using charts, use pipe inside diameters. For piping flow charts not included, use manufacturers' tables and velocity recommendations.

Before attempting to size any water supply system, it is necessary to gather preliminary information which includes available pressure, piping material, select design velocity, elevation differences and developed length to most remote fixture. The water supply system is divided into sections at major changes in elevation or where branches lead to fixture groups. The peak demand must be determined in each part of the hot and cold water supply system which includes the corresponding water supply fixture unit and conversion to gallons per minute flow rate to be expected through each section.

Sizing methods require the determination of the "most hydraulically remote" fixture to compute the pressure loss due to pipe and fittings. The hydraulically remote fixture represents the most downstream fixture along the circuit of piping requiring the most available pressure to operate properly. Consideration must be given to all pressure demands and losses, such as friction due to pipe, fittings and equipment, elevation and the residual pressure required by Table 604.3 of this code. The two most common and frequent complaints about the water supply system operation are lack of adequate pressure and noise.

Problem: What size Type L copper water pipe, service and distribution will be required to serve a two–story factory building having on each floor, back–to–back, two toilet rooms each equipped with hot and cold water? The highest fixture is 21 feet (6401 mm) above the street main, which is tapped with a 2–inch (51 mm) corporation cock at which point the minimum pressure is 55 psi (379.2 kPa). In the building basement, a 2–inch (51 mm) meter with a maximum pressure drop of 11 psi (75.8 kPa) and 3–inch (76 mm) reduced pressure principle backflow preventer with a maximum pressure drop of 9 psi (62.1 kPa) are to be installed. The system is shown by the Example Diagram. To be determined are the pipe sizes for the service main and the cold and hot water distribution pipes.

Solution: A Tabular Arrangement such as shown in Table E101A should first be constructed. The steps to be followed in solving the problem are indicated by the Tabular Arrangement itself as they are in sequence, columns' 1 through 10 and lines a through l.

Step 1
Column 1 and 2: Divide the system into sections breaking at major changes in elevation or where branches lead to fixture groups. After point B (see Figure E103), separate consideration will be given to the hot and cold water piping. Enter the sections to be considered in the service and cold water piping in Column 1 of the Tabular Arrangement. Column 1 of Table E101A provides a line by line recommended tabular arrangement for use in solving pipe sizing. The objective in designing the water supply system is to ensure an adequate water supply and pressure to all fixtures and equipment. Column 2 provides the pounds per square inch (psi) to be considered separately from the minimum pressure available at the main. Such losses to take into consideration are the following: the differences in elevations between the water supply source and the highest water supply outlet, meter pressure losses, the tap in main loss, special fixture devices such as water softeners and backflow preventers and the pressure required at the most remote fixture outlet.

The difference in elevation can result in an increase or decrease in available pressure at the main. Where the water supply outlet is located above the source, this results in a loss in the available pressure and subtracted from the pressure at the water source. Where the highest water supply outlet is located below the water supply source, there will be an increase in pressure which is added to the available pressure of the water source.

Column 3: According to the method given in Section E102.2, determine the g.p.m. of flow to be expected in each section of the system. These flows range from 28.6 to 108 g.p.m. Load values for fixtures must be determined as water supply fixture units and then converted to gallons per minute (g.p.m.) rating to determine peak demand. When calculating peak demands the water supply fixture units are added together then converted to gallons per minute rating. For continuous flow fixtures such as hose bibbs and lawn sprinkler systems, add the gallon per minute demand to the intermittent demand of fixtures. For example, a total of 120 water supply fixture units is converted to 48.0 gallons per minute demand. Two hose bibbs x 5 g.p.m. demand = 10 g.p.m. Total g.p.m. rating = 48.0 g.p.m. + 10 g.p.m. = 58.0 g.p.m. demand.

Step 2

Line a: Enter the minimum pressure available at the main source of supply in Column 2. This is 55 psi (379.2 kPa). The local water authorities generally keep records of pressures at different times of day and year. The available pressure can also be checked from nearby buildings or from fire department hydrant checks.

Line b: Determine from Section 604.3 the highest pressure required for the fixtures on system, which is 15 psi. (103.4 kPa), to operate a flushometer valve. The most remote fixture outlet is necessary to compute the pressure loss due to pipe and fittings and represents the most downstream fixture along the circuit of piping requiring the available pressure to operate properly as indicated by Table 604.3 of this code.

Line c: Determine the pressure loss for the meter size given or assumed. The total water flow from the main through the service as determined in Step 1 will serve to aid in the meter selected. There are three common types of water meters and the pressure losses are determined by the American Water Works Association Standards for displacement type, compound type and turbine type. The maximum pressure loss of such devices takes into consideration the meter size, safe operating capacity (G.P.M.) and maximum rates for continuous operations (g.p.m.). Typically, equipment imparts greater pressure losses than piping.

Line d: Select from Table E103A and enter the pressure loss for the tap size given or assumed. The loss of pressure through taps and tees in pounds per square inch (psi) are based on the total gallons per minute flow rate and size of a tap.

Line e: Determine the difference in elevation between the main and source of supply and the highest fixture on the system and multiply this figure, expressed in feet, by 0.43 psi (2.9 kPa). Enter the resulting psi product on Line e. The difference in elevation between the water supply source and the highest water supply outlet has a significant impact on the sizing of the water supply system. The difference in elevation usually results in a loss in the available pressure because the water supply outlet is generally located above the water supply source. The loss due to the pressure required to lift the water to the outlet. The pressure loss is subtracted from the pressure at the water source. Where the highest water supply outlet is located below the water source, there will be an increase in pressure which is added to the available pressure of the water source.

Lines f, g and h:

The pressure losses through filters, backflow preventers or other special fixtures must be obtained from the manufacturer or estimated and entered on these lines. Equipment such as backflow preventers, check valves water softeners, instantaneous or tankless water heaters, filters and strainers can impart a much greater pressure loss than the piping. The pressure losses can range from 8 psi. to 30 psi.

Step 3

Line i: The sum of the pressure requirements and losses that affect the overall system (Lines b through h) is entered

on this line. Summarizing the steps, all the system losses are subtracted from the minimum water pressure. The remainder is the pressure available for friction, defined as the energy available to push the water through the pipes to each fixture. This force can be used as an average pressure loss, as long as the pressure available for friction is not exceeded. It is recommended that a certain amount be saved for available water supply pressures as an area incurs growth, aging of the pipe or added equipment to the system.

Step 4

Line j: Subtract Line i from Line a. This gives the pressure that remains available from overcoming friction losses in the system. This figure is a guide to the pipe size that is chosen for each section, as the total friction losses to the most remote outlet (measured length is called developed length).

Exception: When the main is above the highest fixture, the resulting psi must be considered a pressure gain (static head gain) and omitted from the sums of Lines b through h and added to Line j. The maximum friction head loss that can be tolerated in the system during peak demand is the difference between the static pressure at the highest and most remote outlet at no-flow conditions and the minimum flow pressure required at that outlet. If the losses are within the required limits, then every run of piping will also is within the required friction head loss. Static pressure loss is the most remote outlet in feet x .433= loss in psi. due to elevation differences.

Step 5

Column 4:

Enter the length of each section from the main to the most remote outlet (at Point E). Divide the water supply system into sections breaking at major changes in elevation or where branches lead to fixture groups.

Step 6

Column 5:

When selecting a trial pipe size the length between the water service or meter to the most remote fixture outlet must be measured to determine the developed length. However, in systems having a flush valve or temperature-controlled shower at the top most floors, the developed length may be found to be from the water meter to the most remote flush valve on the system. A rule of thumb is that size will become progressively smaller as the system extends farther from the main source of supply. Trial pipe size may be arrived at by the following formula: Line J (Pressure available to overcome pipe friction) x 100/Equivalent length of run ♣otal developed length to most remote fixture x percentage factor of 1.5 (note: a percentage factor is used only as an estimate for friction losses imposed for fittings for initial trial pipe size) = Psi (Average pressure drops per 100 feet of pipe).

The equivalent length the friction loss in fittings and valves must be added to the developed length (most remote outlet). Where the size of fittings and valves are not known then the added friction loss must be approximated. A general rule that has been used is to add 50 percent of the developed length to allow for fittings and valves. For example, the equivalent length of run=developed length of run (225') x 1.5 = 338'. The total equivalent length of run for determining a trial pipe size is 338'.

Example: 9.36 (pressure available to overcome pipe friction) x 100/ 338 (Equivalent length of run=225 x 1.5)= 2.77 psi (average pressure drop per 100 feet of pipe).

For trial pipe size see Figure E103A.2 (Type L Copper) based on 2.77 psi and a 108 g.p.m.= 2 ½ inches. To determine the equivalent length of run to the most remote outlet the developed length is determined and added to the friction losses for fittings and valves. The developed lengths of the designated pipe sections are as follows:

A - B	54'
B - C	8'
C - D	13'
D - E	150'

Total developed length = 225'

Step 7
Column 6: Select from Table E103C the equivalent lengths for the trial pipe size of fittings and valves on each pipe section. Enter the sum for each section in Column 6. (The number of fittings to be used in this example must be an estimate.) The equivalent length of piping is the developed length plus the equivalent lengths of pipe corresponding to friction head losses for fittings and valves. Where the size of fittings and valves are not known then the equivalent lengths can be obtained. Where the size of fittings and valves are not know then the added friction head losses must be approximated. A estimate for this example is as follows:

Cold Water Pipe Section	Fittings/Valves	Pressure loss expressed as equivalent length of tube (feet)	Hot Water Pipe Section	Fittings/Valves	Pressure loss expressed as equivalent length of tube (feet)
A-B	3-21/2" Gate Valves	3	A-B	3-21/2" Gate Valves	3
	1-21/2" Side Branch Tee	12		1-21/2" Side Branch Tee	12
B-C	1-21/2"Straight Run Tee	.5	B-C	1-2" Straight Run Tee	7
				1-2" 90 Degree Ell	.5
C-F	1-21/2" Side Branch Tee	12	C-F	1-11/2" Side Branch Tee	7
C-D	1-21/2" 90 Degree Ell	7	C-D	1-1/2" 90 Degree Ell	4
D-E	1-21/2" Side Branch Tee	12	D-E	1-11/2" Side Branch Tee	7

Step 8
Column 7: Add the figures from Column 4 and Column 6, and enter in Column 7. Express the sum in hundreds of feet.

Step 9
Column 8: Select from figure E103A.2 the friction loss per 100 feet (30 480 mm) of pipe for the g.p.m. flow in a section (Column 3) and trial pipe size (Column 5). Maximum friction head loss per 100 feet is determined on the basis of total pressure available for friction head loss and the longest equivalent length of run. The selection is based on the gallon per minute (g.p.m.) demand, the uniform friction head loss and the maximum design velocity. Where the size indicated by hydraulic table, indicate a velocity in excess of the selected velocity, then a size must be selected which produces the required velocity.

Step 10
Column 9: Multiply the figures in Columns 7 and 8 for each section and enter in Column 9.

Total friction loss is determined by multiplying the friction loss per 100 feet for each pipe section in the total developed length by the pressure loss in fittings expressed as equivalent length in feet. Note: Section C-F should not be considered in the total pipe friction losses only if greater loss occurs than pipe section D-E. Section C-F is not considered in the total developed length. Total friction loss in equivalent length is determined as follows:

Cold Water Section		**Hot Water Section**	
	AB 2.21		AB 2.21
	BC .26		BC .22
	CD .38		CD .54
	DE 3.08		DE 5.02

Total pipe friction losses (line k)	5.93	7.99
Excess pressure over pipe friction losses (line l)	3.43	1.37

Step 11
Line k: Enter the sum of the values in Column 9. The value is the total friction loss in equivalent length for each designated pipe section.

Step 12
Line l: Subtract Line k from Line j and enter in Column 10.

The result should always be a positive or plus figures. If it is not, it is necessary to repeat the operation using Columns 5, 6, 8 and 9 until a balance or near balance is obtained. If the difference between Lines j and k is positive and large, it is an indication that the pipe sizes are too large and may, therefore, be reduced, thus saving materials. In such a case, the operations using Columns 5, 6, 8 and 9 should again be repeated.

The total friction losses are determined and subtracted from the pressure available to overcome pipe friction for trial pipe size. This number is critical as it provides a guide whether or not the pipe size selected is too large and the process should be repeated to obtain an economically designed system.

Answer: The final figures entered in Column 5 become the design pipe size for the respective sections. Repeating this operation a second time using the same sketch but considering the demand for hot water, it is possible to size the hot water distribution piping. This has been worked up as a part of the overall problem in the Tabular Arrangement used for sizing the service and cold water distribution piping. It should be noted that consideration must be given the pressure losses from the street main to the water heater (Section AB) in determining the hot water pipe sizes.

Figure E103 Example–Sizing Revise as follows:
In lower left corner, above A: Add an additional "**A'**" (A prime).

Table E101A Delete and Substitute as follows:

TABLE E101A
RECOMMENDED TABULAR ARRANGEMENT FOR USE IN SOLVING PIPE SIZING PROBLEMS

COL	1		2	3	4	5	6	7	8	9	10
Line	Description		Lbs. per square inch (psi)	Gal. per min. through section	Length of section (feet)	Trial pipe size (inches)	Equivalent length of fittings and valves (feet)	Total equivalent length Col. 4 and Col. 6 (100 feet)	Friction loss per 100 feet of trial size pipe (psi)	Friction loss in equivalent length Col. 8 x Col. 7 (psi)	Excess pressure over friction losses (psi)
a	Service and cold water distribution piping[a]	Minimum pressure available at main	55.00								
b		Highest pressure required at a fixture (Section 604.3)	15.00								
c		Meter loss 2" meter	11.00								
d		Tap in main loss 2" tap (Table E103A)	1.61								
e		Static head loss 21 ´ 0.43 psi	9.03								
f		Special fixture loss backflow preventer	9.00								
g		Special fixture loss—Filter	0.00								
h		Special fixture loss—Other	0.00								
i		Total overall losses and requirements (sum of Lines b through h)	45.64								
j		Pressure available to overcome pipe friction (Line a minus Lines b to h)	9.36								
			FU								
	Designation	AB	288	108.0	54	2½	15	.69	3.2	2.21	
	Pipe section (from diagram)	BC	264	104.5	8	2½	.5	.085	3.1	.26	
	Cold water distribution piping	CD	132	77.0	13	2½	7	.20	1.9	.38	
		CF[b]	132	77.0	150	2½	12	1.62	1.9	3.08	
		DE[b]	132	77.0	150	2½	12	1.62	1.9	3.08	
k	Total pipe friction losses (cold)									5.93	
l	Difference (Line j minus Line k)										3.43
	Pipe section (from diagram)	A' B'	288	108.0	54	2½"	12	.69	3.2	2.21	
	Hot water distribution piping	B' C'	24	38.0	8	2"	7.5	.16	1.4	.22	
		C' D'	12	28.6	13	1½"	4	.17	3.2	.54	
		C' F' [b]	12	28.6	150	1½"	7	1.57	3.2	5.02	
		D' E' [b]	12	28.6	150	1½"	7	1.57	3.2	5.02	
k	Total pipe friction losses (hot)									7.99	
l	Difference (Line j minus Line k)										1.37

For **SI**:1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psi = 6.895 kPa, 1 gpm = 3.785 L/m.

a. To be considered as pressure gain for fixtures below main (to consider separately, omit from ''i'' and add to ''j'').

b. To consider separately, in k use C–F only if greater loss than pipe section D-E.

Table E102 Table for Estimating Demand Revise as follows:

Change (cubic feet per minute) for 1 fixture unit from "0.04104" to "0.40104" and for 2 fixture units from "0.0684" to ".6684".

Figures E103B through E103D Revise as follows:

In top title: Change "Feet" to "Foot".

INDEX

F Delete Fuel-Gas-Piping ..... Appendix G

V Add and place under Vacuum Breaker: "Vacuum Drainage Systems ..... Appendix G"

First Printing, January, 2000

(Also see Second Printing)

Sample Ordinance for Adoption of the *International Plumbing Code*

Revise as follows:

In Section 2 Delete the last line in the listing in its entirety.

Table of Contents Page Revise as follows:

Section 104 should read: "Code official"
Chapter 10 should read "Traps, Interceptors and Separators"
Section 1111 should read "Subsoil Drains"
Add title to Appendix D to read "Degree Day and Design Temperatures"
Section F101 Delete "Joist Notching"

101.2 Scope. Revise as follows:

In 2nd line, delete "alternation" and replace with "alteration".

Add: **Exception:** Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories high with separate means of egress and their accessory structures shall comply with the *International Residential Code.*

102.3 Maintenance. Revise as follows:

In 6th line, revise to read:

"....maintained in compliance with the code edition under which they were installed".

102.8 Referenced codes and standards. Revise as follows:

In line 5: "..... requirements of referenced .....".

106.2 Exempt work. Revise as follows:

In Item 1, 2nd line: "pipe, provided that if any concealed trap, ..."

106.5.2 Validity. Revise as follows:

In the 4th line, revise the sentence to read:

"..of this code or any other ordinance of the jurisdiction. No permit...".

108.7.2 Authority to disconnect service utilities. Revise as follows:

In the 6th line: Change buiding to "building...." *(building mis-spelled)*

202 Definitions

FAUCET. Revise to read:

"A valve end of a water pipe through which water ...".

GREASE-LADEN WASTE. Revise as follows:

In 2nd line: "food preparation or other sources ..."

MECHANICAL JOINT. Revise as follows:

In 2nd line: "pipes and fittings that ...".

NUISANCE. Revise as follows:

In 1st line: "Public nuisance as known in ..."

POLLUTION. Revise as follows:

In 4th line: ".... of such potable water ...".

TYPE A DWELLING UNIT. Revise 3rd line to read: "..provisions of ICC A117.1."

TYPE B DWELLING UNIT. Revise 3rd line to read: "..provisions of ICC A117.1."

306.2.3 Soft loadbearing materials. Revise as follows:
In 2nd line: "poor loadbearing quality ...".

307.3 Penetrations of floor-ceiling assemblies and fire-resistance-rated assemblies.
Revise the title and first line to read:
307.3 Penetrations of floor/ceiling assemblies and fire-resistance-rated assemblies.
In 2nd line: "Penetrations of floor/ceiling assemblies...".

312.8 Strom drainage system test.
In 3rd line: "..... with Sections 312.3 or 312.3."

314.2.3 Auxiliary and secondary drain systems.
In Item 1 revise the 9th line to read:
...constructed of corrosion-resistant material. Metallic...
In Item 1 revise the 12th line to read:
...metallic pans shall have a minimum thickness of not less...

403.5 Location of employee toilet facilities in mercantile and assembly occupancies.
Revise the 5th line to read: "...occupancies. Employee facilities shall be either separate...".

404 Accessible plumbing facilities.
Delete all of current text for Section 404 and replace with the following:
"404.1 Where required. Accessible plumbing facilities and fixtures shall be provided in accordance with the *International Building Code.*"

412.4 Public laundries and central washing facilities. Revise as follows:
In 3rd line: ".....,, the rooms containing .....".

422.9 Sterilizer equipment requirements.
Revise the 3rd line to read:
...of the *International Mechanical Code*.

424.1 Approval. Revise as follows:
In 4th line: "to the requirements of NSF 61, Section 9".

424.3 Hand showers. Revise as follows:
In 2nd line: "ASSE 1014 or CSA B125."

424.4 Shower valves.
Revise 424.4 Shower valves as follows:
424.4 Shower valves. Shower and tub-shower combination valves shall be balanced pressure, thermostatic or combination balanced-pressure/thermostatic valves that conform to the requirements of ASSE 1016 or CSA B125. Multiple (gang) showers supplied with a single tempered water supply pipe shall have the water supply for such showers controlled by an approved master thermostatic mixing valve. Shower and tub-shower combination valves and master thermostatic mixing valves required by this section shall be equipped with a means to limit the maximum setting of the valve to 120EF (49EC), which shall be field adjusted in accordance with the manufacturer's instructions.

425.2 Access to conceded connections.
Revise the title to read:

425.2 Access to concealed connections. And move to Section 405.8.

425.4.1 Ball cocks.
Revise 4th line to read:
..least 1 inch (25 mm) above the full opening of the overflow pipe.

425.5 Flush pipes and fittings. Revise as follows:
In 3rd line: "A 112.19.5 or CSA B125."

426.1 Approval. Revise as follows:
In 2nd line: "..... to the requirements of NSF 18."

603.2 Separation of water service and building drain/sewer. Revise as follows:
Revise Section 603.2 to read as follows:

603.2 Separation of water service and building sewer. Water service pipe and the building sewer shall be separated by 5 feet (1524 mm) of undisturbed or compacted earth.

Exception: The required separation distance shall not apply where the bottom of the water service pipe within 5 feet (1524 mm) of the sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials conform to Section 703.1.

Table 604.4 Maximum Flow and Consumption for Plumbing Fixtures and Fixture Fittings Revise as follows:
Revise the third row of the table under the column, Maximum Flow Rate or Quantity to read as follows:
2.5 gpm at 80 psi

605.5 Water distribution pipe. Revise as follows:
In 2nd line: "...and to one of the standards..."

Table 605.6 Pipe Fittings Revise as follows:
In 1st column, under Material, 7th row, 2nd line: "ring for SDR9..."

Table 605.13 Lead Depth For Caulked Cast-iron Pipe Revise as follows:
Delete Table 605.13 in its entirety.

Table 606.5.4 Sizes For Overflow Pipes For Water Supply Tanks Revise as follows:
Change the numbers in column 1 to read as follows:
0-50
51 - 150
151 - 200
201 - 400
401 - 700
701 - 1,000
over 1,000

607.2.1 Piping insulation. Revise as follows:
Insert the word "Equation" in the equation as follows: **(Equation 6-1)**

608.13.2. Reduced pressure principle backflow preventers. Revise as follows:
In 4th line: Change B64.3 to "B 64.4".

608.15.4.1 Deck-mounted and integral vacuum breakers. Revise as follows:
In 7th line: Delete ".4" from (25.4 mm)

Table 702.1 Above-Ground Drainage and Vent Pipe Revise as follows:
In 2nd column (Standard), 13th row: Change referenced standard from B181.2 to "B181.3"

Table 702.2 Underground Building Drainage and Vent Pipe Revise as follows:
In 2nd column (Standard), 10th row: Change referenced standard from B181.2 to "B181.3"

705.7.1 Mechanical joints. Revise as follows:
Revise the 2nd line to read:
..pipe shall be made with an elastomeric seal conforming to...

705.11.1 Caulked joints. Revise as follows:
Delete ".4" from (25.4 mm) in the fourth line

705.17 Drainage slip joints. Revise as follows:
Change referenced section from 405.8 to "424.2".

713.7.1 Piping.
Delete ".4" from (25.4 mm) in the fourth to last line

918.2 Individual branch fixture and individual fixture header vents.
Insert the word "Equation" before (9-1) in the parentheses. Should read **(Equation 9-1)**

1002.3 Prohibited traps.
Revise Item 6 to read:
6. Drum traps.

1107.3 Sizing of secondary drains.
In the fourth line delete the words "by two".

1108.1 Size of combined drains and sewers.
Delete ".4" from "(25.4 mm)" in the last line

1111.1 Subsoil drains.
Revise the 8th line to read:
..location above ground. The subsoil sump shall not be required to..

Referenced Standards:

ANSI:

< Delete ICC/ANSI A117.1—98 in it's entirety

ASME:

< Add A112.4.1–93 Water Heater Relief Valve Drain Tubes.....504.6.2
< A112.14.1—98 - Delete 715.3 and add 715.2
< A112.19.5—98 - Delete 425.4 and add 425.5
< B1.20.1—83 - Delete 605.17.1, 605.20.3, 705.7.4, 705.10.1 and 705.12.3 and add 605.18.1and 705.12.1
< Add B16.32-92 Cast Copper Alloys Solder Joint Fittings for Sovent Drain Systems.....Table 605.6, Table 702.4, Table 1102.7

ASSE:

< 1001–90 - Delete 425.2 and add 425.3
< 1002.79–99 - Delete the .79; also delete 425.3.1 and add 425.4.1
< 1007.73-92 - Delete the .73
< Add 1022–98 Performance Requirements for Backflow Preventer for Carbonated Beverage Machines.....608.16.1
< 1024–98 - Delete 605.9 and add 605.4.1
< 1037 - Add "–90", delete 425.2 and add 425.3
< 1044-86 - Delete 1002 and add 1002.4
< Delete 1050–98 in its entirety
< Add 1060–96 Performance Requirements for Outdoor Enclosures for Backflow Prevention Assemblies.....608.14.1

ASTM:

< A 74–98 - Add Table 1102.7
< B 32–96 - Delete 705.7.3 and 705.8.3 and add 705.9.3 and 705.10.3
< B 152–97A - Delete 425.3.3 and add 425.4.3
< B 813–93 - Delete 705.7.3 and 705.8.3 and add 705.9.3 and 705.10.3
< B 828–92-EO1 - Delete 705.7.3 and 705.8.3 and add 705.9.3 and 705.10.3
< C 425–98 - Delete 705.13 and 705.14 and add 705.15 and 705.16
< C 443–98 - Delete 705.14 and add 705.16
< C 564–97 - Delete 705.14 and add 705.16
< C 1173–97 - Delete 705.14 and add 705.2.1, 705.6, 705.14.1, 705.15, 705.16
< D 1869–95 - Delete 605.21 and 705.14 add 605.22 and 705.16
< D 2235–96a - Delete 705.6.2 and add 705.7.2
< D 2564–96a - Delete 605.20.2, 705.7.2, 705.12.2 and add 605.21.2, 705.8.2, and 705.14.2
< D 2657–97 - Delete 605.18.2, 605.19.2 and add 605.19.2, 605.20.2
< D 2661–97A - Delete 706.6.2 and add 706.7.2
< D 2665–98 - Add Table 1102.7
< D 2846/D 2846M–97 - Delete Table 605.6 and add Table 605.5
< D 2855–96 - Delete 605.20.2, 705.7.2 and 705.12.2 and add 605.21.2, 705.8.2 and 705.14.2
< D 3139–98 - Delete 605.20.1 and add 605.21.1
< D 3212–96a - Delete 705.6.1, 705.7.1 and add 705.7.1, 705.8.1 and 705.14.1
< D 3309–97a - Delete 605.18.2 and 605.18.3 and add 605.19.2 and 605.19.3
< F 477–96a - Delete 605.21 and 705.14 and add 605.22 and 705.16
< F 628–97 - Delete 705.6.2
< F 656–96a - Delete 705.12.2 and add 605.21.2, 705.8.2 and 705.14.2

AWS:

< Delete P.O Box address and change zip code to 33126
< A5.8–92 - Delete 705.7.1 and 705.8.1 and add 705.9.1 and 705.10.1

AWWA:

< Add C104-90 Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.....605.4, 605.6
< Add C115-88 Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.....Table 605.4
< Add C111-90 Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.....605.13

CSA:

< B125–94 - Delete 424.2, 425.3.1 and 425.4 and add 425.4.1 and 425.5
< B137.3–93 - Delete 605.20.2, 705.7.2, and 705.12.2 and
add 605.21.2, 705.8.2 and 705.14.2
< B181.1–96 - Delete 705.6.2 and 715.3 and add 705.7.2 and 715.2
< B181.2–96 - Delete 705.7.2, 705.12.2 and 715.3 and
add 705.8.2, 705.14.2 and 715.2
< B181.6–96 - Add Polyolefin Laboratory Drainage Systems .... Table 702.1
< B182.1-96 - Delete 705.7.2 and 705.12.2 and add 705.8.2 and 705.14.2
< B182.2–95 - Delete Table 702.2
< CAN3-B137.8M–92 - Delete 605.18.2 and 605.18.3 and add 605.19.2 and 605.19.3
< CAN/CSA A257.3M–92 - Delete 705.14 and add 705.16
< CAN/CSA-B64.1.1–94 - Delete 425.2 and add 425.3
< CAN/CSA-B64.3–94 - Delete 608.15.2 and add 608.16.2
< CAN/CSA-B64.4–94 - Delete 608.15.2 and add 608.16.2
< CAN/CSA-602M–90 - Delete 705.12.1, 705.13 and 705.14 and
add 705.14.1, 705.15 and 705.16

CISPI 301-99: Delete 301-99 and add 301.97. Also add Table 1102.7

ICC:
In the address, change the Suite to 708
< Delete /ANSI from ICC/ANSI A117.1–98, also delete 401.1
< IBC-2000 - Delete 404.3 and add 309.1, 1106.5 and 1201.1
< Add ICC EC-2000 ICC Electrical Code™ Administrative
Provisions 201.3, 502.1, 504.3, 1113.1.3
< Add IECC-2000 International Energy Conservation Code™.....313.1, 607.2
< Add IFC-2000 International Fire Code®.....201.3
< IFGC–2000 - Delete 315 and 1201.2 and add 101.2 and 201.3
< IMC–2000 - Delete 1201.2 and 1302.1 and add 612.1 and 1202.1
< Add IPSDC–2000 International Private Sewage Disposal Code®....701.2

NFPA:
< 50-96 - Delete 1303.1 and add 1203.1
< 51-97 - Delete 1303.1 and add 1203.1
< Delete 70-93 in its entirety
< 99C-99 - Delete 1302.1 and add 1202.1

Table E103C Pressure Loss in Fittings and Valves
Expressed as Equivalent Length of Tube
Revise For SI: line to read"
1 degree = "0.01745"