



UPVC

Industrial Piping System

Product Information



Company History



- 1980 Hershey Valve Co. Ltd. was found in Chingshui, Taichung, Taiwan.
- 1982 Moved to Kwanlien industrial District, Wuchi, Taichung, Taiwan.
- 1982 Overseas marketing department was set up to promote export business.
- 1984 Export business expanded to the USA, Canada, Australia, Europe and other advanced countries.
- 1988 USA and Canada became the major export markets.
- 1990 Japan became the most important export country in Asia.
- 1993 Korean market was developed.
- 1995 Responding to the market demands, Taiwan domestic sales department was set up to develop Taiwanese markets.
- 1996 Taiwan factory was awarded SGS ISO 9002 certification.
- 1996 Valve products were approved by NSF International.
- 1997 Shanghai factory was awarded SGS ISO 9002 certification.
- 1997 Began manufacturing SCH40/80 UPVC, SCH40/80 CORZAN® CPVC and SDR 13.5 BlazeMaster® CPVC piping systems in Taiwan Wuchi No. 2 factory.
- 1998 USA Lubrizol (BF Goodrich) authorized Hershey Valves as the exclusive licensee of FlowGuard® CPVC piping system.
- 1998 SCH40 FlowGuard® CPVC hot and cold water distribution system and SCH40 clear PVC piping system came on line.
- 1999 BlazeMaster® CPVC fire sprinkler system was certificated by LPCB (UK).
- 1999 Hershey Valve Taiwan was awarded LPCB ISO 9002.
- 1999 BlazeMaster® CPVC fire sprinkler system was approved by National Fire Administration Ministry of Interior in Taiwan.
- 2001 Hershey Taichang factory was established in China.
- 2003 BlazeMaster® CPVC material obtained WRAS approval.
- 2004 CORZAN® 4910 CPVC sheet obtained FM approval.
- 2005 Hershey BlazeMaster® fire sprinkler fittings were listed by UL (Underwriters Laboratories Inc.).
- 2006 Hershey Taiwan factories were consolidated and moved to Taichung Chungkang Export Processing Zone and it serves as Hershey Group Global Headquarters.
- 2010 Hershey Taiwan factory was awarded LPCB ISO9001: 2008

Design , Installation and Product Specification UPVC Industrial Piping System

Table of Contents

System Description

- 03 Basic Physical Properties
- 03 General Applications
- 04 Applied Industries
- 04 Product Advantages
- 05 Weatherability
- 05 Abrasion Resistance
- 06 Properties Comparison of Commonly used Piping Materials
- 07 Product specification description
- 07 Referenced Standards

Engineering Information

- 08 UPVC Pipe Pressure Rating
- 09 Fluid Handling Characteristics
- 15 Thermal Expansion and Thermal Stresses
- 17 Typical Recommended Maximum Support Spacing

Installation Guides

- 18 General Installation Guides
- 19 Joining UPVC Pipe and Fittings – Solvent Cementing
- 22 Flanging of UPVC pipe
- 24 Underground Installation Guidelines

Product Dimension and Drawing

- 26 SCH 80 & SCH 40 UPVC Pipe
- 27 SCH 80 UPVC Fittings
- 37 SCH 40 UPVC Fittings
- 39 Fabricated Fittings

UPVC Industrial Piping System

System Description

UPVC has been utilized for a long time, it becomes the most general specified thermoplastic material. Overall UPVC has superior basic properties; it has good mechanical strength, chemical resistance and weatherability. As the UPVC has the largest volume of vinyl plastic family, it is exceptionally economical in cost.

Basic Physical Properties

Physical Property	Metric units	Imperial units	Test Condition	Standard
Cell Classification	12454			ASTM D1784
Specific Gravity	1.35 ~ 1.40		23°C	ASTM D792
Tensile Strength	50 N/mm ²	7200 psi	23°C	ASTM D638
Flexural Strength	63 N/mm ²	9,200 psi	23°C	ASTM D790
Modulus of Elasticity in Tension	2,758 N/mm ²	400,000 psi	23°C	ASTM D638
Heat Deflection Temp	70 °C	158 °F	264psi, 23°C	ASTM D648
Softening Temp.(Vicat)	76 °C	169 °F	Loading 50 NN	ASTM D1525
Izod Impact (Notch)	40 J/m	0.75 ft-lb/in	23°C	ASTM D256
Coefficient of Thermal Expansion	6×10^{-5} cm/cm · °C	3×10^{-5} in/in · °F		ASTM D696
Flammability	V0			UL-94 (Tested, not listed)
Maximum Operation Temperature	55°C	131°F		

Note : Data presented are typical values.

General Applications

- Acid /alkaline chemicals transportation systems
- Pure water transportation systems
- Salt water transportation systems
- Drinking water transportation systems
- Irrigation Water transportation systems
- Chemical waste transportation systems
- Environmental engineering general piping systems
- Air conditioning chilling water supply/return piping systems

Applied Industries

- Electroplating factory
- Electronic industry plant
- Steel industry plant
- Power plant
- Food factory
- Pharmaceutical Plant
- Hospital
- Chemical industry plant
- Semiconductor industry plant
- Nuclear power plant
- Paper mill
- Beverage factory
- Waste water treatment plant

Product Advantages

Chemical Resistance

- UPVC piping systems have good chemical resistance, especial in acids, bases and salts.

Electrical Resistance

- UPVC piping systems have very excellent insulating property.

High Strength

- UPVC products are highly resilient, tough and durable with high tensile and high impact strength.

Low Friction Loss

- The smooth interior surfaces of UPVC assure low friction loss and high flow rate. Additionally, since UPVC pipe will not rust, pit, scale, or corrode, the high flow rate will be maintained for the life of the piping system.

Easy Installation

- There are many joint methods, such as solvent cement, threaded, flanged, & hot air welding.

Low Thermal Conductivity

- UPVC pipe has a much lower thermal conductivity factor than metal pipe. Therefore, fluids being piped maintain a more constant temperature. In most cases, pipe insulation is not required.

Cost Effective

- UPVC piping system is light weight, convenient to handle, relatively flexible, and easy to install. These features lead to lower installation cost than other piping systems.

Light Weight

- UPVC pipe is light in weight (approximately one-half the weight of aluminum and one-sixth the weight of steel) reducing transportation, handling, and installation cost.

Maintenance Free

- Once an UPVC system is properly selected, designed, and installed, it is virtually maintenance free. It will not rust, pit, scale, corrode, or promote build-up on the interior. Therefore, years of trouble-free service can be expected when using UPVC piping system.

Long Life

- There is over 30 years of actual usage life of Hershey UPVC piping system in these fields.

Weatherability

Weatherability is defined as a material's ability to maintain its basic physical properties after prolonged exposure to sunlight, wind and rain/humidity.

Hershey UPVC has been blended with a titanium dioxide (TiO₂) and carbon black. TiO₂ coupled with carbon black is widely recognized as an excellent ultraviolet blocking agent and helps to protect the polymer backbone from the effects of ultraviolet radiation. Therefore, Hershey UPVC piping system will be able to meet the requirements of most outdoor installations.

If the specific installation requires additional protection from UV exposure, Hershey UPVC piping system can be painted with common acrylic latex paint. Priming of the piping is not necessary prior to painting.

Abrasion Resistance

A piping system's resistance to abrasion is a function of many factors:

- ◆ Particle size and shape
- ◆ Particle concentration
- ◆ Velocities
- ◆ Design of the piping system
- ◆ Hardness of particles
- ◆ Densities of fluid and particle
- ◆ Properties of piping materials

Hershey UPVC piping systems will usually outperform metal when transporting abrasive media and have been used successfully in many abrasive industrial applications.

One widely referenced test method is the Taber Abrasion Test, in which the weight loss of a material is measured after being exposed to an abrasive wheel for 1000 cycles. While the Taber test cannot predict actual performance of a material to a given application, it does provide a relative measure to compare materials.

TABER ABRASION TESTER (Abrasion Ring CS-10, Load 1 kg)

Material	Weight loss (mg/1000 cycles)	Material	Weight loss (mg/1000 cycles)
Nylon 6-10	5	CTFE	13
UHMW PE	5	PS	40-50
PVDF	5-10	Steel (304 SS)	50
PVC (rigid)	12-20	ABS	60-80
PP	15-20	PTFE	500-1000
CPVC	20		

Properties Comparison of Commonly Used Piping Materials

	UPVC	PP	HDPE	ABS	GIP*	SS*
Joint	Solvent welding	Heat melted welding	Heat melted welding	Solvent welding	Threading or welding	Threading or welding
Life	Long	Middle	Middle	Middle	Short	Very long
Friction loss	Low	Medium	Medium	Low	High	Low
Chemical resistance	Excellent	Good	Good	Fair	Bad	Good
Thermal conductivity	Low	Low	Low	Low	High	High
Maximum operation temperature(°C)	55	80	70	70	400	400
Earthquake resistance	Good	Good	Good	Good	Bad	Bad
Impact resistance	Good	Excellent	Excellent	Excellent	Good	Vary
Operating pressure	High	Medium	Medium	Medium	High	Vary
Weatherability	Good	Bad	Bad	bad	Good	Excellent
Maintenance	Easy	Difficult	Difficult	Easy	Difficult	Easy
Installation	Easy	Difficult	Difficult	Easy	Difficult	Difficult
Cost	Low	Medium	Medium	Medium	Low	High
Specific gravity	1.4	0.91	0.95	1.0	7.9	7.9

Note : 1. *GIP : Galvanized Iron Pipe, SS : Stainless Steel

2. Information provided in the Table is for reference only.



Product specification description

UPVC piping system products are manufactured by high quality PVC compound without plasticizer(DOP). All UPVC materials meet ASTM D1784 requirements.

Pipe :

UPVC pipe meets ASTM D1785 SCH 40 and SCH 80 requirements.

Fittings :

UPVC threaded fittings meet ASTM D2464, UPVC SCH 40 socket fittings meet ASTM D2466, and UPVC SCH 80 socket fittings meet D2467.

Cleaners (Primer) and Solvent Cements :

Socket fittings and pipes are suggested to be jointed by cleaner (primer) and solvent cements. The procedure of application should follow ASTM D2855 standard.

Marking :

All pipes and fittings are requested to bear manufacturing company name or logo , production date, material ASTM standard.

Referenced Standards

ASTM D1784 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic pipe, Schedule 40, 80 and 120

ASTM D2464 Standard Specification for Threaded Poly (vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40

ASTM D2467 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

ASTM D2564 Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems

ASTM F402 Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings

ASTM D2855 Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings

ASTM F656 Specification for Primer for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings

Engineering Information

UPVC Pipe Pressure Rating

Size	OD (inch)	SCH 80		SCH 40	
		Water Pressure Rating	Water Pressure Rating	Water Pressure Rating	Water Pressure Rating
		kg/cm ²	psi	kg/cm ²	psi
1/2"	0.840	59.76	850	42.18	600
3/4"	1.050	48.51	690	33.75	480
1"	1.315	44.29	630	31.64	450
1-1/4"	1.660	36.56	520	26.01	370
1-1/2"	1.900	33.04	470	23.2	330
2"	2.375	28.12	400	19.69	280
2-1/2"	2.875	29.53	420	21.09	300
3"	3.500	26.01	370	18.28	260
4"	4.500	22.5	320	15.47	220
5"	5.563	20.39	290	13.36	190
6"	6.625	19.69	280	12.66	180
8"	8.625	17.58	250	11.25	160
10"	10.750	16.17	230	9.84	140
12"	12.750	16.17	230	9.14	130
14"	14.000	15.47	220	9.14	130
16"	16.000	15.47	220	9.14	130
18"	18.000	15.47	220	9.14	130
20"	20.000	15.47	220	8.44	120
24"	24.000	14.76	210	8.44	120

Note :

1. Pressure rating applies for water at 73°F. For temperature greater than 73°F see derating factors. For fluids other than water the full pressure rating may not apply, see chemical resistance table.
2. Schedule 80 pipe operating above 130°F should not be threaded. Use flanged joints, or Victaulic coupling where occasional disassembly is necessary.
3. All dimension of SCH40 should never be threaded, SCH80 pipe if diameter 6" and greater also should never be threaded.

Temperature Derating Factors – UPVC Pipe

Temperature Correction Factors - Pipe

Operation Temperature		Factor	
°F	°C	PVC	CPVC
70	21	1.00	1.00
80	27	0.90	0.96
90	32	0.75	0.92
100	38	0.62	0.85
110	43	0.50	0.77
115	46	0.40	0.74
120	49	0.45	0.70
125	52	0.32	0.66
130	54	0.30	0.62
140	60	0.22	0.55
150	66	*	0.47
160	71	*	0.40
170	77	*	0.32
180	82	*	0.25
200	93	NR	0.18
210	99	NR	*

Pressure Ratings for Flanged Systems

Flanged systems of any size should not exceed 150 psi working pressure.

Pressure Ratings for Threaded Systems

Threaded systems are derated to 50% of the pressure rating for the piping at the system operating temperature.

Friction Loss in Pipe

A great advantage that UPVC pipe enjoys over its metallic competitors is a smooth inner surface which is resistant to scaling and fouling. This means that friction pressure losses in the fluid flow are minimized from the beginning and do not significantly increase as the system ages, as can be the case with metal pipes subject to scaling.

The Hazen-Williams formula is the generally accepted method of calculating friction head losses in piping systems. The values in the following fluid flow tables are based on this formula and a surface roughness constant of C=150 for 1 UPVC pipe. Surface roughness constants for other piping materials are given below:

$$f = 0.2083 \times \left(\frac{100}{d} \right)^{1.852} \frac{g^{1.852}}{c^{4.8655}}$$

Where f = friction head in feet of water per 100 feet of pipe

d = inside diameter of pipe in inches

g = flow rate in gallons per minute

c = pipe surface roughness constant

Constant (C)	Type of Pipe
150	PVC/CPVC pipe, new-40 years old
130-140	Steel/cast iron pipe, copper new
125	Steel pipe, old
120	Cast iron, copper 4-12 years old
110	Galvanized steel; Cast iron, 13-20 years old
60-80	Cast iron, worn/pitted

Friction Loss in Fittings

Friction losses through fittings are calculated from the equivalent length of straight pipe which would produce the same friction loss in the fluid. The equivalent lengths of pipe for common fittings are given below.

Equivalent Length of Pipe (Feet)*

Nominal Size (in)	90° Standard Elbow	45° Standard Elbow	Standard Tee Run Flow	Standard Tee Branch Flow
½	1.5	0.8	1.0	4.0
¾	2.0	1.1	1.4	5.0
1	2.6	1.4	1.7	6.0
1¼	3.8	1.8	2.3	7.0
1½	4.0	2.1	2.7	8.1
2	5.7	2.7	4.3	12.0
2½	6.9	3.3	5.1	14.
3	7.9	4.1	6.2	16.3
4	11.4	5.3	8.3	22.0
6	16.7	8.0	12.5	32.2
8	21.0	10.6	16.5	39.7
10	25.1	13.4	19.1	50.1
12	29.8	15.9	22.4	63.0

* The data provided in this table is for reference only.

Pressure Drop in Valves and Strainers

The equation for calculating pressure drop in this manner is:

$$\Delta P \cdot \rho = \frac{G^2}{Cv^2}$$

Where: ΔP = water pressure drop in psi

G = maximum flow rate in gallons per minute

Cv = the valve flow coefficient

ρ = specific gravity of fluids

Typical flow coefficients at fully opening for different valves and strainers are given below. Pressure drops for fluids other than water may be calculated by multiplying ΔP value with specific gravity of the fluid.

Valves	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"	6"	8"
MIP Ball	8	15	29	75	90	140	330	480	600	-	-	-
Double Union Ball	8	15	29	75	90	140	330	480	600	-	-	-
Single Union Ball	8	15	29	75	90	140	-	-	-	-	-	-
Swing Check	15	22	76	120	120	125	255	285	490	-	1050	1800
Butterfly	-	-	-	-	70	120	260	310	480	830	1000	2300
Diaphragm	6	6.5	11	14	32.5	54	110	150	250	-	-	-
Strainers (Clean)	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	5"	6"	8"
Y Type	3.8	6.6	8.4	20	25	35	60	60	95	-	-	-
T Type	6	9.5	29	-	40	55	-	125	155	-	-	-

Water Hammer Surge Pressure

Whenever the flow rate of liquid in a pipe is changed, there is a surge in pressure known as water hammer. The longer the line and the faster the fluid is moving, the greater the hydraulic shock will be. Water hammer may be caused by opening or closing a valve, starting or stopping a pump, or the movement of entrapped air through the pipe. The maximum water hammer surge pressure may be calculated from:

$$P_{wh} = \frac{\rho \Delta V}{g_c} \left[\frac{\rho}{g_c} \left(\frac{1}{K} + \frac{d}{bE} \right) \right]^{-1/2}$$

where P_{wh} = maximum surge pressure, PSI

ρ = fluid density (lb/ft³)

ΔV = change in fluid velocity (ft/s)

g_c = gravitational constant (32.2 ft/s²)

K = bulk modulus of elasticity of fluid (lb/ft²) $K_{\text{water}} = 43.2 \times 10^6 \text{ lb/ft}^2$

d = pipe inside diameter (inches)

b = pipe wall thickness (inches)

E = pipe material bulk modulus of elasticity (PSI)

The values in the following table are based on this formula at 73°F and the assumption that water flowing at a given rate of gallons per minute is suddenly completely stopped. The value for fluids other than water may be approximated by multiplying by the square root of the fluid's specific gravity.

The water hammer surge pressure plus the system operating pressure should not exceed 1.5 times the recommended working rating of the system.

In order to minimize hydraulic shock due to water hammer, linear fluid flow velocity should generally be limited to 5 ft/s, particularly for pipe size of 6" or larger velocity at system start-up should be limited to 1 ft/s during filling until it is certain that all air has been flushed from the system and the pressure has been brought up to operating conditions.

Air should not be allowed to accumulate in the system while it is operating. Pumps should not be allowed to draw in air.

Where necessary, extra protective equipment may be used to prevent water hammer damage. Such equipment might include pressure relief valve, shock absorbers, surge arrestors and vacuum air relief valves.

Carrying Capacity and Friction Loss for Schedule 80 Thermoplastic

(Independent variables: Gallons per minute and nominal O.D. Dependent variables: Velocity, friction head and pressure drop per 100 feet of pipe, interior smooth.)

Gallons per minute	3 in										4 in										6 in										8 in										10 in										12 in										18 in										24 in																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
	Flow Velocity (feet per second)					Friction Head Loss (ft Water/100 ft)					Friction Pressure Loss (PSI/100 ft)					Maximum Pressure (PSI)					Flow Velocity (feet per second)					Friction Head Loss (ft Water/100 ft)					Friction Pressure Loss (PSI/100 ft)					Maximum Pressure (PSI)					Flow Velocity (feet per second)					Friction Head Loss (ft Water/100 ft)					Friction Pressure Loss (PSI/100 ft)					Maximum Pressure (PSI)					Flow Velocity (feet per second)					Friction Head Loss (ft Water/100 ft)					Friction Pressure Loss (PSI/100 ft)					Maximum Pressure (PSI)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	1 in					2 in					3 in					4 in					5 in					6 in					7 in					8 in					9 in					10 in					11 in					12 in					13 in					14 in					15 in					16 in					17 in					18 in					19 in					20 in					21 in					22 in					23 in					24 in																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	1.655	2.198	0.940	44.130	0.779	0.473	0.205	71.630	1.407	1.043	0.46	37.260	0.777	0.748	0.107	16.041	0.567	0.173	0.049	13.161	0.164	17.305	0.775	0.639	0.276	31.755	0.957	0.291	0.372	0.143	0.865	0.374	43.409	0.957	0.537	0.195	1.052	0.455	43.670	1.116	0.298	0.125	34.370	0.780	0.244	0.054	17.350	0.174	15.851	0.106	17.305	0.548	0.132	0.028	12.173																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
3	4.395	15.016	7.260	132.900	2.338	3.819	1.564	54.770	2.336	1.916	57.150	1.795	1.191	0.375	44.429	1.587	0.513	0.143	15.000	0.164	17.305	1.795	1.439	0.576	63.470	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455	43.670	2.336	0.537	0.697	0.268	1.052	0.455

Caution: Flow velocity should not exceed 5 feet per second. PVC and CPVC pipe cannot be used for compressed air service.

Carrying Capacity and Friction Loss for Schedule 40 Thermoplastic

(Independent variables: Gallons per minute and nominal O.D. Dependent variables: Velocity, friction head and pressure drop per 100 feet of pipe, interior smooth.)

Gallons per minute	3 in			4 in			6 in			8 in			10 in			12 in			20 in		
	Flow Velocity (feet Per Second)	Friction Head Loss (ft Water/100 Ft)	Maximum Surge Loss (PSI/100 Ft)	Maximum Pressure (PSI)	Flow Velocity (feet Per Second)	Friction Head Loss (ft Water/100 Ft)	Maximum Surge Loss (PSI/100 Ft)	Maximum Pressure (PSI)	Flow Velocity (feet Per Second)	Friction Head Loss (ft Water/100 Ft)	Maximum Surge Loss (PSI/100 Ft)	Maximum Pressure (PSI)	Flow Velocity (feet Per Second)	Friction Head Loss (ft Water/100 Ft)	Maximum Surge Loss (PSI/100 Ft)	Maximum Pressure (PSI)	Flow Velocity (feet Per Second)	Friction Head Loss (ft Water/100 Ft)	Maximum Surge Loss (PSI/100 Ft)	Maximum Pressure (PSI)	
1	1.105	1.107	0.476	28.540	0.823	0.274	0.116	12.710	0.559	0.166	0.072	13.791	0.483	0.078	0.037	9.603	0.478	0.074	0.032	11.254	
2	3.315	3.465	1.659	85.920	2.489	0.906	0.305	44.130	1.448	0.672	0.276	25.334	1.058	0.438	0.105	22.985	0.605	0.302	0.087	15.003	
3	5.524	5.881	2.780	140.200	4.133	1.599	0.334	70.550	2.489	1.008	0.438	42.050	1.731	0.672	0.166	25.334	0.876	0.374	0.032	11.254	
4	7.735	8.294	4.133	200.430	5.823	2.250	0.359	100.900	3.445	1.376	0.491	58.002	2.489	0.906	0.202	33.802	1.165	0.478	0.032	11.254	
5	9.946	10.664	5.524	260.660	7.516	2.901	0.384	131.130	4.590	1.854	0.544	76.000	3.445	1.211	0.276	44.130	1.448	0.504	0.032	11.254	
6	12.157	12.972	6.913	320.890	9.209	3.552	0.409	161.360	5.735	2.332	0.595	101.130	4.590	1.500	0.359	58.002	1.731	0.532	0.032	11.254	
7	14.368	15.183	8.302	381.120	10.902	4.203	0.434	191.590	6.880	2.813	0.646	131.360	5.735	1.789	0.434	76.000	2.014	0.560	0.032	11.254	
8	16.579	17.388	9.691	441.420	12.595	4.854	0.459	221.820	8.025	3.294	0.698	161.360	6.880	2.077	0.519	101.130	2.297	0.584	0.032	11.254	
9	18.790	19.593	11.080	501.650	14.288	5.505	0.484	251.820	9.169	3.775	0.750	191.590	8.025	2.369	0.595	131.360	2.579	0.608	0.032	11.254	
10	20.999	21.798	12.469	561.880	15.981	6.156	0.509	281.820	10.310	4.256	0.802	221.820	9.169	2.650	0.672	161.360	2.860	0.624	0.032	11.254	
11	23.208	23.999	13.858	622.110	17.674	6.807	0.534	311.820	11.451	4.737	0.854	251.820	10.310	2.931	0.750	191.590	3.141	0.640	0.032	11.254	
12	25.417	26.199	15.247	682.340	19.367	7.458	0.559	341.820	12.592	5.218	0.906	281.820	11.451	3.212	0.823	221.820	3.422	0.656	0.032	11.254	
13	27.626	28.399	16.636	742.570	21.060	8.109	0.584	371.820	13.733	5.699	0.958	311.820	12.592	3.493	0.906	251.820	3.703	0.672	0.032	11.254	
14	29.835	30.599	18.025	802.800	22.753	8.760	0.609	401.820	14.874	6.180	1.010	341.820	13.733	3.775	0.977	281.820	3.984	0.688	0.032	11.254	
15	32.044	32.799	19.414	863.030	24.446	9.411	0.634	431.820	15.981	6.661	1.062	371.820	14.874	4.056	1.050	311.820	4.265	0.704	0.032	11.254	
16	34.253	34.999	20.803	923.260	26.139	10.062	0.659	461.820	17.060	7.142	1.114	401.820	15.981	4.337	1.121	341.820	4.546	0.720	0.032	11.254	
17	36.462	37.199	22.192	983.490	27.832	10.713	0.684	491.820	18.141	7.623	1.166	431.820	17.060	4.618	1.180	371.820	4.827	0.736	0.032	11.254	
18	38.671	39.399	23.581	1043.720	29.525	11.364	0.709	521.820	19.222	8.104	1.218	461.820	18.141	4.900	1.239	401.820	5.108	0.752	0.032	11.254	
19	40.880	41.599	24.970	1103.950	31.218	12.015	0.734	551.820	20.303	8.585	1.270	491.820	19.222	5.181	1.298	431.820	5.389	0.768	0.032	11.254	
20	43.089	43.799	26.359	1164.180	32.911	12.666	0.759	581.820	21.384	9.066	1.322	521.820	20.303	5.462	1.357	461.820	5.670	0.784	0.032	11.254	
21	45.298	45.999	27.748	1224.410	34.604	13.317	0.784	611.820	22.465	9.547	1.374	551.820	21.384	5.743	1.376	491.820	5.951	0.799	0.032	11.254	
22	47.507	48.199	29.137	1284.640	36.297	13.968	0.809	641.820	23.546	10.028	1.426	581.820	22.465	6.024	1.405	521.820	6.232	0.815	0.032	11.254	
23	49.716	50.399	30.526	1344.870	37.990	14.619	0.834	671.820	24.627	10.509	1.478	611.820	23.546	6.305	1.424	551.820	6.513	0.831	0.032	11.254	
24	51.925	52.599	31.915	1405.100	39.683	15.270	0.859	701.820	25.708	10.990	1.530	641.820	24.627	6.586	1.443	581.820	6.794	0.847	0.032	11.254	
25	54.134	54.799	33.304	1465.330	41.376	15.921	0.884	731.820	26.789	11.471	1.582	671.820	25.708	6.867	1.462	611.820	7.075	0.863	0.032	11.254	
26	56.343	56.999	34.693	1525.560	43.069	16.572	0.909	761.820	27.870	11.952	1.634	701.820	26.789	7.148	1.481	641.820	7.356	0.879	0.032	11.254	
27	58.552	59.199	36.082	1585.790	44.762	17.223	0.934	791.820	28.951	12.433	1.686	731.820	27.870	7.429	1.500	671.820	7.637	0.895	0.032	11.254	
28	60.761	61.399	37.471	1646.020	46.455	17.874	0.959	821.820	30.032	12.914	1.738	761.820	28.951	7.710	1.519	701.820	7.918	0.911	0.032	11.254	
29	62.970	63.599	38.860	1706.250	48.148	18.525	0.984	851.820	31.113	13.395	1.790	791.820	30.032	7.991	1.538	731.820	8.199	0.927	0.032	11.254	
30	65.179	65.799	40.249	1766.480	49.841	19.176	1.009	881.820	32.194	13.876	1.842	821.820	31.113	8.272	1.557	761.820	8.480	0.943	0.032	11.254	
31	67.388	67.999	41.638	1826.710	51.534	19.827	1.034	911.820	33.275	14.357	1.894	851.820	32.194	8.553	1.576	791.820	8.761	0.959	0.032	11.254	
32	69.597	70.199	43.027	1886.940	53.227	20.478	1.059	941.820	34.356	14.838	1.946	881.820	33.275	8.834	1.595	821.820	9.042	0.975	0.032	11.254	
33	71.806	72.399	44.416	1947.170	54.920	21.129	1.084	971.820	35.437	15.319	1.998	911.820	34.356	9.115	1.614	851.820	9.323	0.991	0.032	11.254	
34	74.015	74.599	45.805	2007.400	56.613	21.780	1.109	1001.820	36.518	15.800	2.050	941.820	35.437	9.396	1.633	881.820	9.604	1.007	0.032	11.254	
35	76.224	76.799	47.194	2067.630	58.306	22.431	1.134	1031.820	37.599	16.281	2.102	971.820	36.518	9.677	1.652	911.820	9.885	1.023	0.032	11.254	
36	78.433	78.999	48.583	2127.860	60.000	23.082	1.159	1061.820	38.680	16.762	2.154	1001.820	37.599	9.958	1.671	941.820	10.166	1.039	0.032	11.254	
37	80.642	81.199	49.972	2188.090	61.693	23.733	1.184	1091.820	39.761	17.243	2.206	1031.820	38.680	10.239	1.690	971.820	10.447	1.055	0.032	11.254	
38	82.851	83.399	51.361	2248.320	63.386	24.384	1.209	1121.820	40.842	17.724	2.258	1061.820	39.761	10.520	1.709	1001.820	10.728	1.071	0.032	11.254	
39	85.060	85.599	52.750	2308.550	65.079	25.035	1.234	1151.820	41.923	18.205	2.310	1091.820	40.842	10.801	1.728	1031.820	11.009	1.087	0.032	11.254	
40	87.269	87.799	54.139	2368.780	66.772	25.686	1.259	1181.820	43.004	18.686	2.362	1121.820	41.923	11.082	1.747	1061.820	11.290	1.103	0.032	11.254	
41	89.478	89.999	55.528	2429.010	68.465	26.337	1.284	1211.820	44.085	19.167	2.414	1151.820	43.004	11.363	1.766	1091.820	11.571	1.119	0.032	11.254	
42	91.687	92.199	56.917	2489.240	70.158	26.988	1.309	1241.820	45.166	19.648	2.466	1181.820	44.085	11.644	1.785	1121.820	11.852	1.135	0.032	11.254	
43	93.896	94.399	58.306	2549.470	71.851	27.639	1.334	1271.820	46.247	20.129	2.518	1211.820	45.166	11.925	1.804	1151.820	12.133	1.151	0.032	11.254	
44	96.105	96.599	59.695	2609.700	73.544	28.290	1.359	1301.820	47.328	20.610	2.570	1241.820	46.247	12.206	1.823	1181.820	12.414	1.167	0.032	11.254	
45	98.314	98.799	61.084	2669.930	75.237	28.941	1.384	1331.820	48.409	21.091	2.622	1271.820	47.328	12.487	1.842	1211.820	12.695	1.183	0.032	11.254	
46	100.523	101.000	62.473	2730.160	76.930	29.592	1.409	1361.820	49.490	21.572	2.674	1301.820	48.409	12.768	1.861	1241.820	12.976	1.199	0.032	11.254	
47	102.732	103.209	63.862	2790.390	78.623	30.243	1.434	1391.820	4												

Thermal Expansion and Thermal Stresses

General

It is important to consider thermal expansion when designing a system with Hershey UPVC pipe. Most thermoplastics have a coefficient of thermal expansion which is significantly higher than those of metals. The thermal expansion of a piping system subject to a temperature change can therefore be significant, and may need compensation in the system design. The expansion or contraction of thermoplastic pipe may be calculated from the following formula:

Thermal Expansion Formula

$$\Delta L = L_p C \Delta T$$

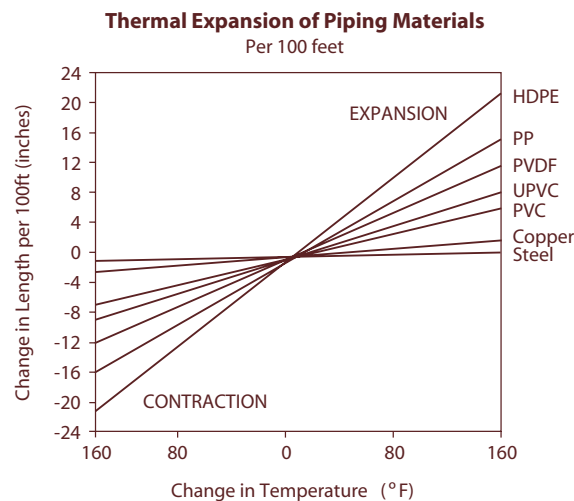
Where: ΔL = Change in length due to change in temperature (in.)

L_p = Length of pipe (in.)

C = Coefficient of thermal expansion (in./in./°F) = 3.3×10^{-5} in./in./°F for PVC

ΔT = Change in temperature (°F)

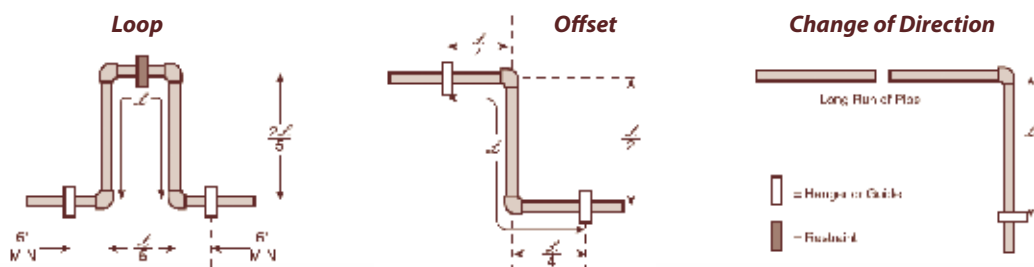
The thermal expansion and contraction of PVC and other piping materials is displayed below.



Expansion Loops and Offsets

As a rule of thumb, if the total temperature change is greater than 30°F (17°C), compensation for thermal expansion should be included in the system design. The recommended method of accommodating thermal expansion is to include expansion loops, offsets, or changes in direction where necessary in the system design.

An expansion loop schematic is presented here.



Expansion Loop Formula

$$L_L = \sqrt{\frac{3ED\Delta L}{2S}}$$

Where: L_L = Loop length (in.)

E = Modulus of elasticity at maximum temperature (psi)

S = Working Stress at maximum temperature (psi)

D = Outside diameter of pipe (in.)

ΔL = Change in length due to change in temperature (in.)

Expansion loops and offsets should be constructed with straight pipe and 90° elbows which are solvent cemented together. If threaded pipe is used in the rest of the system, it is still recommended that expansion loops and offsets be constructed with solvent cement in order to better handle the bending stresses incurred during expansion. The expansion loop or offset should be located approximately at the midpoint of the pipe run and should not have any supports or anchors installed in it. Valves or strainers should not be installed within an expansion loop or offset.

Thermal Stresses

If thermal expansion is not accommodated, it is absorbed in the pipe as an internal compression. This creates a compressive stress in the pipe. The stress induced in a pipe which is restrained from expanding is calculated with the following formula:

$$S = EC\Delta T$$

Where: S = stress induced in the pipe

E = Modulus of elasticity at maximum temperature

C = coefficient of thermal expansion

ΔT = total temperature change of the system

Modulus of Elasticity and Working Stress for UPVC

Temperature		Modulus, E		Stress, S	
°F	°C	psi	MPa	psi	MPa
73	23	400,000	2,758	2,000	14
90	32	372,000	2,565	1,500	10
100	38	352,000	2,427	1,300	9
110	43	336,000	2,316	1,000	7
120	49	316,000	2,179	800	5
130	54	300,000	2,068	600	4

Typical Recommended Maximum Support Spacing

Pipe Size (in.)	SCH80 - Temperature (°F)				SCH40 - Temperature (°F)			
	60	80	100	120	60	80	100	120
1/2"	5	4.5	4.5	3	4.5	4.5	4	2.5
3/4"	5.5	5	4.5	3	5	4.5	4	2.5
1"	6	5.5	5	3.5	5.5	5	4.5	3
1-1/4"	6	6	5.5	3.5	5.5	5.5	5	3
1-1/2"	6.5	6	5.5	3.5	6	5.5	5	3.5
2"	7	6.5	6	4	6	5.5	5	3.5
2-1/2"	7.5	7.5	6.5	4.5	7	6.5	6	4
3"	8	7.5	7	4.5	7	7	6	4
4"	9	8.5	7.5	5	7.5	7	6.5	4.5
6"	10	9.5	9	6	8.5	8	7.5	5
8"	11	10.5	9.5	6.5	9	8.5	8	5
10"	12	11	10	7	10	9	8.5	5.5
12"	13	12	10.5	7.5	11.5	10.5	9.5	6.5
14"	13.5	13	11	8	12	11	10	7
16"	14	13.5	11.5	8.5	12.5	11.5	10.5	7.5
18"	14.5	14	12	11	13	12	11	8
20"	15.5	14.5	12.5	11.5	14	12.5	11.5	10
24"	17	15	14	12.5	15	13	12.5	11

(Unit : Feet)

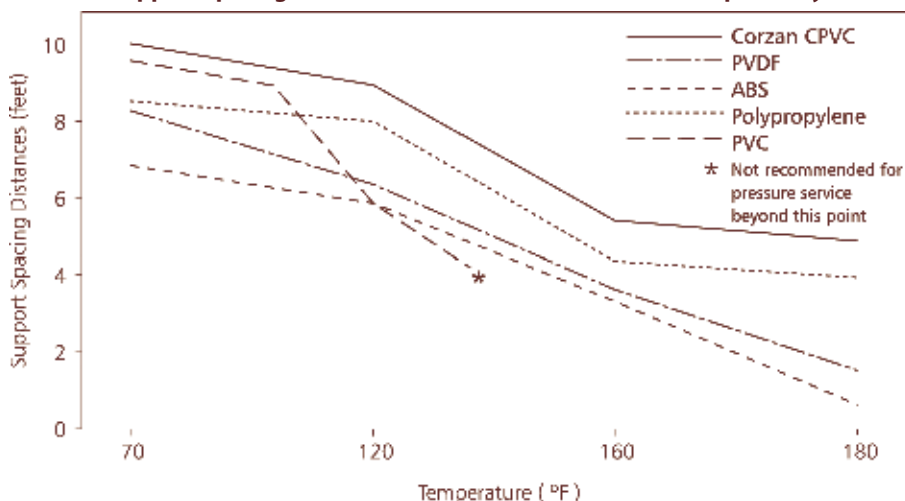
* Chart based on spacing for continuous spans and for uninsulated line conveying fluids of specific gravity up to 1.00.

* The pipe should not be anchored tightly by the support, but secured in a manner to allow for movement caused by thermal expansion and contraction. It is recommended that you use clamps or straps that allow pipe to remain away from the framing, thus reducing the noise generated when pipe is allowed to rub against wood.

* If normally working temperature usually keep above 120°F, it is recommended to use CPVC piping systems.

Specific Gravity	1.0	1.1	1.2	1.4	1.6	2.0	2.5
Correction Factor	1.00	0.98	0.96	0.93	0.90	0.85	0.80

Support Spacing for 6 Inch Diameter, Schedule 80 Thermoplastic Systems



Pipe Hangers, Clamps, & Supports



Band Hanger



Anchor Strap



Pipe Clamp



Pipe Clamp



Clevis Hanger



U-Bolt



Roller Hanger



Roller Hanger



Roller Chair



Roller Hanger



Roller Hanger



Roller Stand

Installation Guides

General Installation Guides

Proper install of UPVC piping systems is critical to the performance of the system. A few sample guidelines should be followed to ensure long service life and safe operation.

Handling

Proper care should be exercised when transporting or installing Hershey UPVC piping to prevent damage. Hershey UPVC piping should be stored and shipped only with other non-metallic piping. It should not be dropped or dragged during handling, especially during extremely cold weather. The same treatment should apply to the handling of Hershey UPVC fittings.

Prior to actual installation, the pipe and fittings should be thoroughly inspected for cracks, gouges, or other signs of damage. Particular attention should be given to the inside surface of the part. While the outside surface may not exhibit damage,

improper handling can result in damage that appears only on the inside surface of the part.

Cutting

Lengths of pipe can be easily and successfully cut by following a few simple guidelines. Best results are obtained by using fine-toothed saw blades (16 to 18 teeth per inch) with little or no offset (0.025" max.). Circular power saws (6,000 rpm) or band saws (3,600 ft./min.) are recommended using ordinary hand pressure. Miter boxes or other guide devices are strongly recommended for manual operation to ensure square cuts. Burrs, chips, and dust should be removed following cutting to prevent contamination of the piping system and facilitate joining.

Joining Methods

Hershey UPVC piping can be installed using a

number of joining techniques. Solvent welding, flanging, and threading are the more common methods and are covered in greater detail in this section. Back welding of joints using hot gas welders is also covered in some detail. Less common joining methods are also possible with Hershey UPVC piping and fittings. Contact Hershey Sales rep. for assistance with less common joining methods.

Hanging/Laying of Pipe

Hershey UPVC piping can be installed above ground or buried underground. Methods to minimize stress on the piping as a result of installation are covered in detail below.

System Stress

Any metal or non-metal piping system is subject to stress-induced corrosion. As a result, special attention should be given to minimizing stress throughout the system. The total stress on a piping system includes not only the known pressure stress, but also stresses from sources such as expansion or installation. Expansion stresses can be minimized with expansion joints or loops. Installation stresses are minimized with careful installation techniques. Pipe and fittings should be properly prepared when joints are made up. Hangers and supports should be properly spaced to prevent sagging and

should not cut into the pipe or clamp it tightly, preventing movement. System components should not be forced into place.

Thermal Expansion

UPVC piping has the lowest coefficient of thermal expansion of any thermoplastic piping. However, thermal expansion will be greater than that of metal piping. Typically, expansion loops or offsets in the piping are designed to account for any thermal expansion. These design methods are covered in detail in page 15 Expansion joints can also be installed. Information on expansion joints can be obtained by contacting Hershey Valve sale rep.

Testing the Piping System

After the piping system is installed and any solvent cement is fully cured, the system should be pressure tested and checked for leaks using water. Testing using compressed air or inert gas is not recommended. All entrapped air should be allowed to vent as the system is filled with water. Water filling should occur at a velocity not more than 1ft/sec. After filling, the system should be pressured to 125% of the maximum design pressure of the lowest rated part of the system. Pressure should be held for no more than one hour while the system is checked for leaks.

Joining UPVC Pipe and Fittings – Solvent Cementing

Cutting

Hershey UPVC pipe can be easily cut with a ratchet cutter, wheel-type plastic tubing cutter, power saw, or fine-toothed saw. To ensure the pipe is cut square, a mitre box must be used when cutting with a saw. Cutting the pipe as squarely as possible provides the maximum bonding surface area.

Chamfering and Deburring

Burrs and filings can prevent proper contact between the pipe and fitting and may put undue stress on the pipe and fitting assembly. Burrs and filings must be removed from the outside and inside of the pipe. A chamfering tool or file is suitable for this purpose. A slight bevel should be placed at the end of the pipe to ease entry of the pipe into the socket and minimize the chances of

wiping solvent cement from the fitting. For pipe sizes 2 inches and larger a 10° -15° chamfer of 3/32" is recommended.

Fitting Preparation

Loose soil and moisture should be wiped from the fitting socket and pipe end with a clean, dry rag. Moisture can slow the curing, and at this stage of assembly excessive water can reduce the joint strength. The dry fit of the pipe and fitting should be checked. The pipe should enter the fitting socket easily 1/4 to 3/4 of the depth. If the pipe bottoms in the fitting with little interference, extra solvent cement should be used to prepare the joint.

Primer Application

Use primer conforming to ASTM F656. Primer

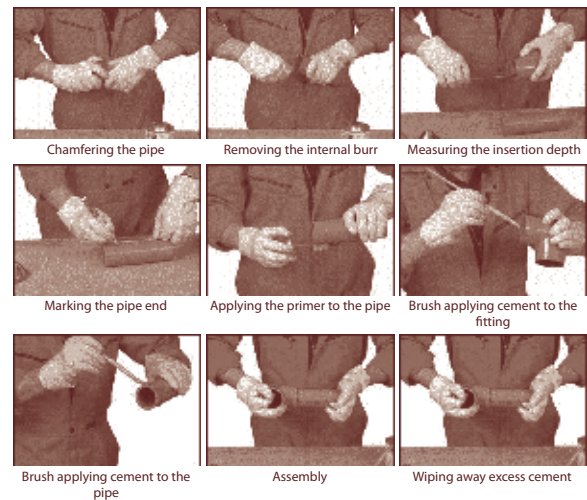
is needed to prepare the bonding area for the addition of the cement and subsequent assembly. It is important that a proper applicator be used. A dauber, swab or paintbrush approximately half the size of the pipe diameter is appropriate. A rag should not be used. Primer is applied to both the outside of the pipe end and inside of the fitting socket, redipping the applicator as necessary to ensure that the entire surface of both is tacky.

Solvent Cement Application

Use only solvent cement conforming to ASTM D2564. Solvent cement must be applied when the pipe surface is tacky, not wet, from primer. Joining surfaces must be penetrated and softened. Cement should be applied with a natural bristle brush or swab half the size of the pipe diameter. A dauber may be used to apply cement on pipe sizes below 2 inches. A heavy, even coat of cement should be applied to the outside of the pipe end, and a medium coat should be applied to the inside of the fitting socket. Pipe sizes greater than 2 inches should receive a second coat of cement on the pipe end.

Assembly

After cement application, for smaller pipe under 4" should immediately be inserted into the fitting socket and rotated 1/8 to 1/4 turn until the fitting-stop is reached. The fitting should be properly aligned for installation at this time. The pipe must meet the bottom of the fitting socket. The assembly should be held in place for 10 to 30 seconds to ensure initial bonding and to avoid pushout. A bead of cement should be evident around the pipe and fitting juncture. If this bead is not continuous around the socket shoulder, it may indicate that insufficient cement was applied. In this case, the fitting should be discarded and the joint reassembled. Cement in excess of the bead may be wiped off with a rag.



Joining of Large Diameter Pipe

For 6 inch or larger diameter pipe, a pipe puller (come-along) is recommended to assemble the joint and hold it in place for the initial set time without applying excess force that may damage the pipe or fitting. This equipment should be set up prior to the start of priming so the assembly can happen quickly while primer and cement are still fluid.

Set and Cure Times

Solvent cement set and cure times are a function of pipe size, temperature, relative humidity, and tightness of fit. Drying time is faster for drier environments, smaller pipe sizes, high temperatures, and tighter fits. The assembly must be allowed to set, without any stress on the joint, per the time shown in the following tables. Following the initial set period, the assembly can be handled carefully avoiding significant stresses to the joint.

Extra care should be exercised when systems are assembled in extreme temperature conditions. Extra set and cure times should be allowed when the temperature is below 40°F (4°C). When the temperature is above 100°F (38°C), the assembler should ensure that both surfaces to be joined are still wet with cement before joining them.

Recommended Set Times

After a joint is assembled using solvent cement, it should not be disturbed for a period of time to allow for proper “setting” of the newly prepared joint. Recommended set times are as follows:

Average Initial Set Schedule

Ambient Temperature	1/2" to 1 1/4"	1 1/2" to 2"	2 1/2" to 8"	10" to 15"	15" +
60°F to 100°F	2 min	5 min	30 min	2 hrs	4 hrs
40°F to 60°F	5 min	10 min	2 hrs	8 hrs	16 hrs
0°F to 40°F	10 min	15 min	12 hrs	24 hrs	48 hrs

Note:

1. Initial set schedule is the necessary time to allow before the joint can be carefully handled. In damp or weather allow 50% more set time.
2. These figures are estimates based on laboratory tests using water; extended set times are required for economical applications. Due to the many variables in the field, these figures should be used as a general guide only.

Recommended Cure Times

After a joint is assembled using solvent cement, the cement must be allowed to properly “cure” before the piping system is pressurized. Recommended minimum cure times are shown below. These recommendations should only serve as a guide since atmospheric conditions during installation will affect the curing process. High humidity and/or colder weather will require longer cure times: typically add 50% to the recommended cure time if surroundings are humid or damp.

	1/2" - 1 1/4"		1 1/2" - 2"		2 1/2" - 8"		10" - 15"	15"+
Ambient Temperature	-160 psi	160- 370 psi	-160 psi	160 -315 psi	- 160 psi	160 -315 psi	-100 psi	-100 psi
60°F to 100°F	15 min	6 hrs	30 min	12 hrs	90 min	24 hrs	48 hrs	72 hrs
40°F to 60°F	20 min	12 hrs	45 min	24 hrs	4 hrs	48 hrs	96 hrs	6 days
0°F to 40°F	30 min	48 hrs	1 hr	96 hrs	72 hrs	8 days	8 days	14 days

Note: These figures are estimates based on laboratory tests using water; extended set times are required for economical applications. Due to the many variables in the field, these figures should be used as a general guide only.

Back-Welding of Pipe Joints

Back-welding may be used to repair minor leaks in solvent a welding rod to fuse in the joint fillet while both rod and fillet are softened with hot air.

Before hot-air welding begins, the section of piping where the repair will be made must be emptied. Joints should not be welded with fluid still in the pipe.

All dirt and moisture should be wiped away from the joint to be repaired. Excess dried solvent cement around the joint should be removed with an emery cloth. Residual solvent cement may tend to scorch and burn during welding. If the joint to be welded is a threaded joint, excess threads in the joint area should be removed with a file in order to provide a smooth surface for welding.

If a speed tip will be used for back-welding, please contact BFGoodrich or Hershey Valve for relative information.

If welding will be done by feeding the rod manually, the following conditions and procedures should be used :

The welding temperature should be approximately 550 ~ 600°F.

The end of the welding rod should be inserted into the junction of the pipe and fittings, and the rod should be held at a 90° angle to the joint. The rod and base material should be preheated with

the welding torch 1/4 to 3/4 inch away from both the rod and the base material and fanning back and forth in the immediate welding area. while preheating, the rod can be moved up and down until it is soft enough to stick to the base.

When the materials are softened enough to fuse, the rod should be advanced by the application of a slight pressure. The fanning motion of the torch should be continued throughout the welding process. when the weld is finished, another inch of rod material should be lapped over the bead.

When large diameter pipe is welded, three beads may be required to fill the joint adequately, the first bead should be laid directly into the joint fillet, and the subsequent beads on either side of the first bead.

Flanging of UPVC pipe

Flanging can be used to provide temporary disassembly of a piping system or when it is not possible to make up solvent cemented joints at the assembly site.

Flanges are joined to the pipe by solvent cement or threaded joints. Refer to the sections on solvent cementing or threading of UPVC pipe for the proper techniques.

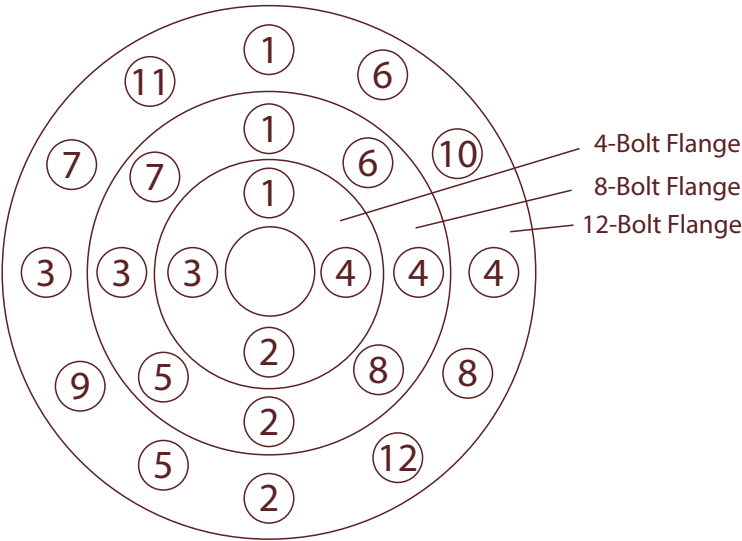
Flanged joints incorporate an elastomeric gasket between the mating faces to provide for a seal. The gasket selected must be full-faced and have a hardness of 55-80 durometer A. Typically, gaskets are 1/8” thick. The gasket material must be resistant to the chemical environment. Many manufacturers of gasketing materials supply this kind of information. The flanges should be carefully aligned and the bolts inserted through matching

holes. A flat washer should be used beneath each nut and bolt head. Each bolt should be partially tightened in the alternating sequence indicated in the patterns below. A torque wrench should be used for the final tightening of the bolts. The bolts should be tightened to the torque recommended in the table below in the same alternating sequence used previously.

Recommended Bolt Torque

Nominal Pipe Size	Number of Bolt Holes	Bolt Diameter (in)	Recommended Torque (ft-lbs)
1/2 – 1 1/2	4	1/2	10 ~ 15
2 ~ 3	4	5/8	20 ~ 30
4	8	5/8	20 ~ 30
6	8	3/4	33 ~ 50
8	8	3/4	33 ~ 50
10	12	7/8	53 ~ 75
12	12	1	80 ~ 110

Flage Bolt Tightening Patterns



Underground Installation Guidelines

References

These guidelines are based upon the following:

1. ASTM D2774
Standard Recommended Practice for Underground Installation of Thermoplastic Piping.
2. Industry Experience
For additional information and data, consult ASTM standards D2774, D2321, or F645.

Installation Procedures

This procedure will cover the typical steps encountered in underground installations: trench design, trench preparation, piping assembly, laying of pipe, and backfilling.

Trench Design

Width: The trench should be of adequate width to allow for convenient installation, but as narrow as possible depending on whether the piping will be assembled inside or outside of the trench.

Depth: The trench depth should be sufficient to place the pipe deep enough to meet frost, above-ground load, and any trench bedding requirements.

Frost: Piping at least 12 inches below the frost line.

Loads: Piping should be deep enough to keep external stress levels below acceptable design stress. Design stress will be determined by pipe size and operating

temperature and may be governed by various codes.

Bedding: 4 to 6 inches underneath piping, if necessary.

Trench Preparation

The trench bottom should be continuous, relatively smooth and free of rocks. If ledge rock, hardpan, boulders, or rocks that are impractical to remove are encountered, it will be necessary to pad the trench bottom to protect the piping from damage. 4 to 6 inches of tamped earth or sand bedding will be sufficient in such situations.

Piping Assembly/Placement

Piping may be assembled using conventional solvent cementing techniques either inside or outside of the trench depending on the specific installation requirements. Solvent cement usually requires at least 12 to 24 hours for the cemented joint to cure properly. During this critical curing process, every effort should be made to minimize the stress on any joints. As a result, the piping should not be moved during the curing period, nor should the pipe be backfilled, or otherwise constrained during curing. See the recommendations on joint curing time to determine the exact curing requirements for a specific installation.

If the piping was assembled outside of the trench, the pipe may be placed into the trench after proper curing, but **MUST NOT** be rolled or dropped into place. Long lengths of joined piping should be

properly supported as the piping is put into place to prevent excessive stress.

After proper curing and before backfilling, the piping should be brought to within 15°F of the expected operating temperature. Backfilling can proceed while the piping is maintained at this temperature in order to minimize stress on the system due to thermal expansion/contraction. If this step is impractical, then stress calculations must be done to determine the loads that will be created due to constrained thermal expansion/contraction.* These loads must then be compared to the design stress of the particular piping system.

Backfilling

Backfilling should only proceed after all solvent cement joints have been properly cured and the piping brought close to normal operating temperature, if operation will be more than 15°F

different than the current ambient temperature. The piping should be uniformly supported over its entire length on firm, stable material.

Backfill material should be free of rocks and have a particle size no greater than 1/2." Piping should initially be surrounded with backfill to provide between 6" and 8" of cover. The backfill should be compacted using vibratory or water flooding methods. If water flooding is used, additional material should not be added until the water flooded backfill is firm enough to walk on. Backfill containing a significant amount of fine-grained material, such as silt or clay, should be hand or mechanically tamped.

The remainder of the backfill should be placed and spread in approximately uniform layers to completely fill the trench without voids. Particle size for this final fill should not exceed 3." Rolling equipment or heavy tampers should only be used to consolidate the final backfill.

Product Dimension and Drawing

SCH 80 and SCH 40 UPVC Pipe

SCH 80 UPVC Pipe

Size	Standard			
	D	Tolerance	t(min)	Tolerance
1/2"	21.34	±0.10	3.73	+0.51
3/4"	26.67	±0.10	3.91	+0.51
1"	33.40	±0.13	4.55	+0.53
1-1/4"	42.16	±0.13	4.85	+0.58
1-1/2"	48.26	±0.15	5.08	+0.61
2"	60.32	±0.15	5.54	+0.66
2-1/2"	73.02	±0.18	7.01	+0.84
3"	88.90	±0.20	7.62	+0.91
4"	114.30	±0.23	8.56	+1.02
5"	141.30	±0.25	9.52	+1.14
6"	168.28	±0.28	10.97	+1.32
8"	219.08	±0.38	12.70	+1.52
10"	273.05	±0.38	15.06	+1.80
12"	323.85	±0.38	17.45	+2.08
14"	355.60	±0.38	19.05	+2.29
16"	406.40	±0.48	21.41	+2.57
18"	457.20	±0.48	23.80	+2.84
20"	508.00	±0.58	26.20	+3.15
24"	609.60	±0.79	30.94	+3.71

(unit:mm)



SCH 40 UPVC Pipe

Size	Standard			
	D	Tolerance	t(min)	Tolerance
1/2"	21.34	±0.10	2.77	+0.51
3/4"	26.67	±0.10	2.87	+0.51
1"	33.40	±0.13	3.38	+0.51
1-1/4"	42.16	±0.13	3.56	+0.51
1-1/2"	48.26	±0.15	3.68	+0.51
2"	60.32	±0.15	3.91	+0.51
2-1/2"	73.02	±0.18	5.16	+0.61
3"	88.90	±0.20	5.49	+0.66
4"	114.30	±0.23	6.02	+0.71
5"	141.30	±0.25	6.55	+0.79
6"	168.28	±0.28	7.11	+0.86
8"	219.08	±0.38	8.18	+0.99
10"	273.05	±0.38	9.27	+1.12
12"	323.85	±0.38	10.31	+1.24
14"	355.60	±0.38	11.10	+1.35
16"	406.40	±0.48	12.70	+1.52
18"	457.20	±0.48	14.27	+1.70
20"	508.00	±0.58	15.06	+1.80
24"	609.60	±0.79	17.45	+2.08

(unit:mm)

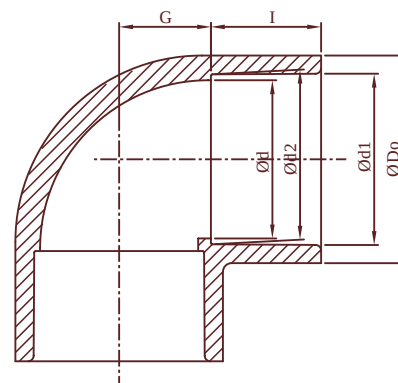


SCH 80 UPVC Fittings

SCH 80 UPVC 90° Elbow (Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	l	d	G
1/2"	31.5	21.54	21.23	22.22	16.5	12.8
3/4"	38	26.87	26.57	25.4	22	15.3
1"	46	33.65	33.27	28.58	28	18
1-1/4"	55	42.42	42.04	31.75	35	23
1-1/2"	60	48.56	48.11	34.93	43	26
2"	75	60.63	60.17	38.1	54	32
2-1/2"	90	73.38	72.85	44.45	69	38
3"	107	89.31	88.70	47.63	84	48
4"	133	114.76	114.1	57.15	105	59
5"	163.5	141.81	141	66.68	136	80
6"	191	168.83	168.00	76.2	150	89
8"	246	219.84	218.69	101.6	200	115
10"	306.5	273.81	272.67	127	265	150
12"	364	324.61	323.47	152.4	315	180
14"	396.5	356.49	355.22	*180	346	248

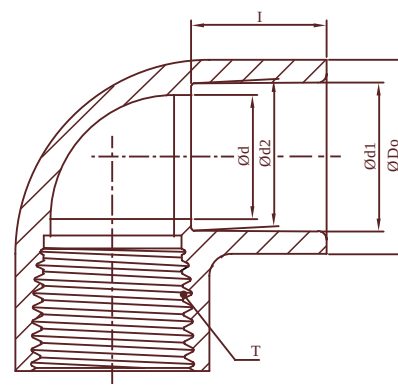
Note : Do not comply with ASTM standards, if mark with *. (unit : mm)



SCH 80 UPVC 90° Elbow (Slip×NPT)

Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	l	d	NPT (thd./in)
1/2"	30.5	21.54	21.23	22.22	16	14
3/4"	38	26.87	26.57	25.4	22	14
1"	46	33.65	33.27	28.58	28	11.5
1-1/4"	55	42.42	42.04	31.75	35	11.5
1-1/2"	60	48.56	48.11	34.93	43	11.5
2"	75	60.63	60.17	38.1	54	11.5

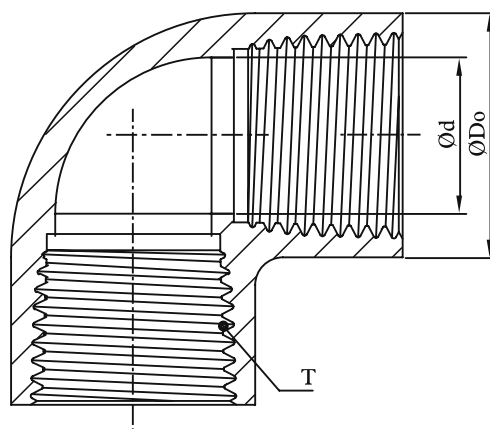
(unit : mm)



SCH 80 UPVC 90° Elbow (NPT×NPT)

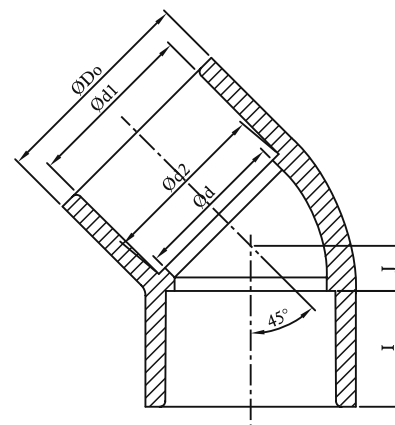
Size	Outside Dia	Structure Diameter	
	D0	d	NPT(thd./in)
1/2"	30.5	16	14
3/4"	38	22	14
1"	46	28	11.5
1-1/4"	55	35	11.5
1-1/2"	60	43	11.5
2"	75	54	11.5

(unit : mm)



SCH 80 UPVC 45° Elbow (Slip×Slip)

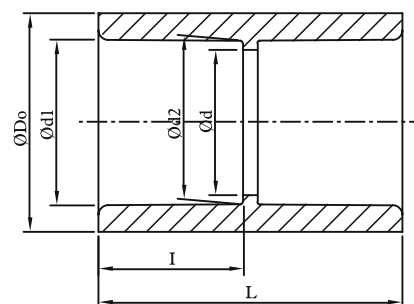
Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	l	d	J
1/2"	30.5	21.54	21.23	22.22	16.5	6.5
3/4"	40	26.87	26.57	25.4	22	8
1"	46	33.65	33.27	28.58	28	8
1-1/4"	56	42.42	42.04	31.75	35	10
1-1/2"	62.5	48.56	48.11	34.93	43	12
2"	75.5	60.63	60.17	38.1	54	16
2-1/2"	90	73.38	72.85	44.45	69	18
3"	107	89.31	88.70	47.63	84	20
4"	133	114.76	114.1	57.15	108	26
5"	163.5	141.81	141	66.68	136	38.5
6"	191	168.83	168.00	76.2	150	45
8"	246	219.84	218.69	101.6	200	51
10"	307	273.81	272.67	127	265	60
12"	364	324.61	323.47	152.4	315	73
14"	396.5	356.49	355.22	*180	350	90



Note : Do not comply with ASTM standards, if mark with *. (unit : mm)

SCH 80 UPVC Coupling (Slip×Slip)

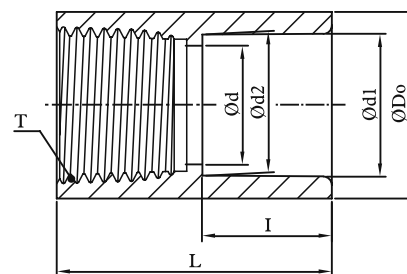
Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	I	d	L
1/2"	30.5	21.54	21.23	22.22	16.5	50
3/4"	38	26.87	26.57	25.4	22	63.5
1"	46	33.65	33.27	28.58	28	70
1-1/4"	55.5	42.42	42.04	31.75	35	75
1-1/2"	61	48.56	48.11	34.93	42.5	77
2"	73.5	60.63	60.17	38.1	54	84
2-1/2"	89	73.38	72.85	44.45	65	100
3"	106	89.31	88.70	47.63	80	108
4"	133	114.76	114.1	57.15	100	126
5"	163	141.81	141	66.68	134.5	160
6"	191	168.83	168.00	76.2	158	169
8"	246	219.84	218.69	101.6	200	220
10"	307	273.81	272.67	127	259	283
12"	364	324.61	323.47	152.4	308	336.5
14"	396.5	356.49	355.22	205	346	436.5
16"	454	407.54	405.89	230	396	486.5



Note : Do not comply with ASTM standards, if mark with *. (unit : mm)

SCH 80 UPVC Coupling (Slip×NPT)

Size	Outside Dia	Socket Type			Structure Diameter		
	D0	d1	d2	I	d	L	NPT(thd./in)
1/2"	30.5	21.54	21.23	22.22	16.5	50	14
3/4"	38	26.87	26.57	25.4	22	63.5	14
1"	46	33.65	33.27	28.58	28	70	11.5
1-1/4"	55.5	42.42	42.04	31.75	35	75	11.5
1-1/2"	61	48.56	48.11	34.93	42.5	77	11.5
2"	73.5	60.63	60.17	38.1	54	84	11.5

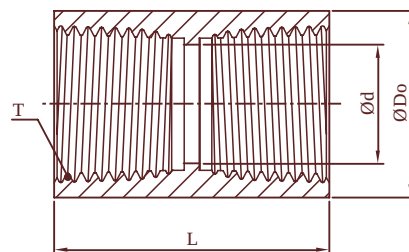


(unit : mm)

SCH 80 UPVC Coupling (NPT×NPT)

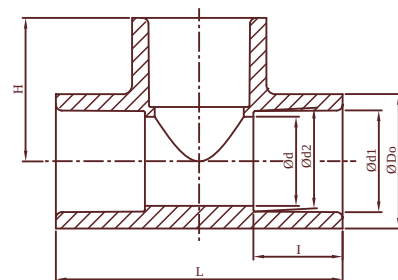
Size	Outside Dia	Structure Diameter		
	D0	d	L	NPT(thd./in)
1/2"	30.5	16.5	50	14
3/4"	38	22	63.5	14
1"	46	28	70	11.5
1-1/4"	55.5	35	75	11.5
1-1/2"	61	42.5	77	11.5
2"	73.5	54	84	11.5

(unit : mm)



SCH 80 UPVC Tee (Slip×Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter		
	D0	d1	d2	I	d	L	H
1/2"	30	21.54	21.23	22.22	16.5	73	37.25
3/4"	37	26.87	26.57	25.4	24	89.5	42.5
1"	46	33.65	33.27	28.58	28	103	51.5
1-1/4"	55.5	42.42	42.04	31.75	35	119.5	57.75
1-1/2"	63.5	48.56	48.11	34.93	41	128	64
2"	75	60.63	60.17	38.1	52	152	73
2-1/2"	92	73.38	72.85	44.45	69	173	86.5
3"	109	89.31	88.70	47.63	84	197	98.5
4"	135	114.76	114.1	57.15	109	239	119.5
5"	163.5	141.81	141	66.68	136	298	149
6"	191	168.83	168.00	76.2	150	336.5	168.25
8"	246	219.84	218.69	101.6	200	439	219.5
10"	317	273.81	272.67	127	265	560	280
12"	364	324.61	323.47	152.4	315	660	330
14"	396.5	356.49	355.22	*180	346	856.5	428.25



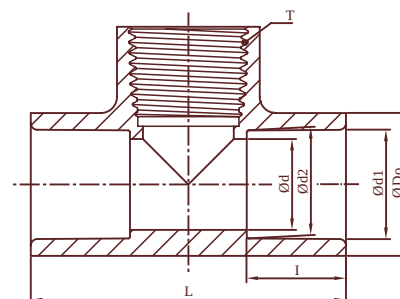
Note : Do not comply with ASTM standards, if mark with *.

(unit : mm)

SCH 80 UPVC Tee (Slip×Slip×NPT)

Size	Outside Dia	Socket Type			Structure Diameter		
	D0	d1	d2	I	d	L	NPT(thd./in)
1/2"	30	21.54	21.23	22.22	16.5	73	14
3/4"	37	26.87	26.57	25.4	24	89.5	14
1"	46	33.65	33.27	28.58	28	103	11.5
1-1/4"	55.5	42.42	42.04	31.75	35	119.5	11.5
1-1/2"	63.5	48.56	48.11	34.93	41	128	11.5
2"	75	60.63	60.17	38.1	52	152	11.5

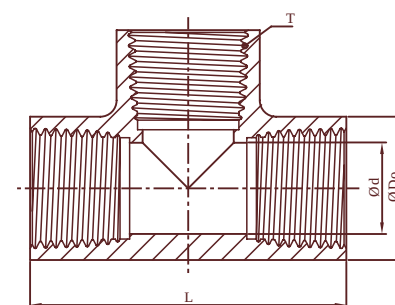
(unit : mm)



SCH 80 UPVC Tee (NPT×NPT×NPT)

Size	Outside Dia	Structure Diameter		
	D0	d	L	NPT(thd./in)
1/2"	30	16.5	73	14
3/4"	37	24	89.5	14
1"	46	28	103	11.5
1-1/4"	55.5	35	119.5	11.5
1-1/2"	63.5	41	128	11.5
2"	75	52	152	11.5

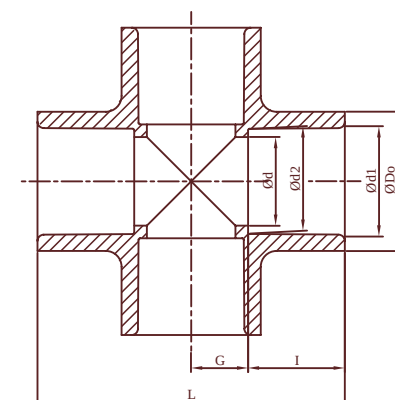
(unit : mm)



SCH 80 UPVC Cross (Slip×Slip×Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter		
	D0	d1	d2	I	d	G	L
1/2"	32	21.54	21.23	22.22	16.5	13	74.5
3/4"	44	26.87	26.57	25.4	22	15.4	86
1"	47	33.65	33.27	28.58	28	17.8	97
1-1/4"	56	42.42	42.04	31.75	35	23	116
1-1/2"	65	48.56	48.11	34.93	43	26.1	128.5
2"	78	60.63	60.17	38.1	54	31.8	146
2-1/2"	89	73.38	72.85	44.45	65	37.8	171
3"	105	89.31	88.70	47.63	80	47.6	196
4"	132	114.76	114.1	57.15	100	58	236.5

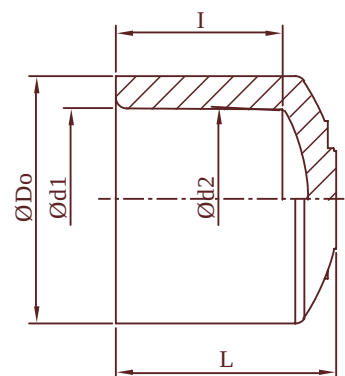
(unit : mm)



SCH 80 UPVC Cap (Slip)

Size	Outside Dia	Socket Type			Structure Diameter
	D0	d1	d2	l	L
1/2"	30.5	21.54	21.23	22.22	31
3/4"	37	26.87	26.57	25.4	36
1"	45.5	33.65	33.27	28.58	41
1-1/4"	55	42.42	42.04	31.75	46
1-1/2"	61.5	48.56	48.11	34.93	50
2"	75	60.63	60.17	38.1	55.5
2-1/2"	91	73.38	72.85	44.45	65.5
3"	106	89.31	88.70	47.63	69.5
4"	134	114.76	114.1	57.15	78
5"	163.5	141.81	141	66.68	108
6"	192	168.83	168.00	76.2	118.5
8"	246	219.84	218.69	101.6	143
10"	307	273.81	272.67	127	194
12"	366	324.61	323.47	152.4	235.5
14"	395	356.49	355.22	180	226
16"	452	407.54	405.89	205	258.5

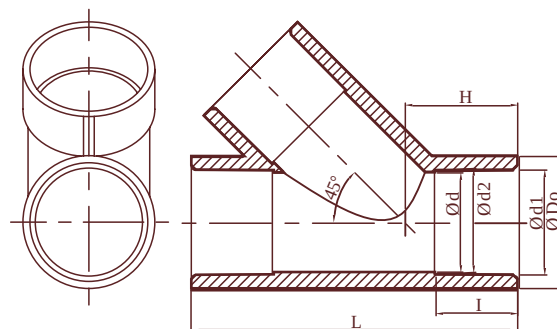
(unit : mm)



SCH 80 UPVC Y-Tee (45°, Slip×Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter		
	D0	d1	d2	l	d	L	H
1/2"	30.5	21.54	21.23	22.22	19	90	34
3/4"	36	26.87	26.57	25.4	24.5	105	40
1"	44	33.65	33.27	28.58	31	117	42
1-1/4"	61	42.42	42.04	31.75	40	150	52
1-1/2"	61	48.56	48.11	34.93	46	150	52
2"	76.5	60.63	60.17	38.1	58.5	181	60
3"	106	89.31	88.70	47.63	74	222	68
4"	132	114.76	114.1	57.15	100	277	83
6"	191	168.83	168	76.2	150	393	114
8"	246	219.84	218.69	101.6	200	570	177

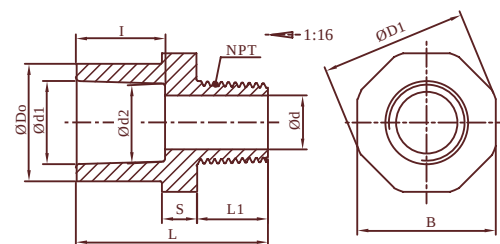
(unit : mm)



SCH 80 UPVC Male Adapter (Slip×NPT)

Size	Outside Dia	Socket Type			Structure Diameter						
	D0	d1	d2	l	d	S	L	L1	B	D1	NPT
1/2"	30.5	21.54	21.23	22.22	13	9	50	19	36	38	14
3/4"	35	26.87	26.57	25.4	17	9	50	15	41	43	14
1"	44	33.65	33.27	28.58	23	9	59	21	50	53	11.5
1-1/4"	54	42.42	42.04	31.75	29	9	61	19	60	63	11.5
1-1/2"	60	48.56	48.11	34.93	37	9	72	27	65	68	11.5
2"	73	60.63	60.17	38.1	48	10	77	27	80	83	8
2-1/2"	88	73.38	72.85	44.45	57	11.5	97	40	95	100	8
3"	105	89.31	88.70	47.63	72	14	103	42	115	122	8
4"	132	114.76	114.1	57.15	96	14	116	45	145	154	8

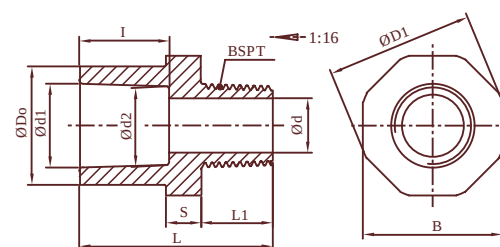
(unit : mm)



SCH 80 UPVC Male Adapter (Slip×BSPT)

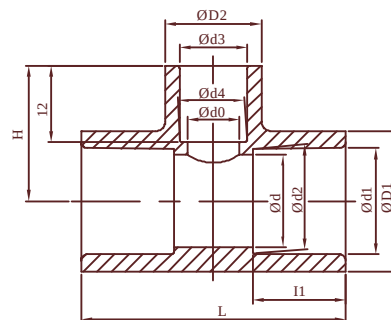
Size	Outside Dia	Socket Type			Structure Diameter						
	D0	d1	d2	l	d	S	L	L1	B	D1	BSPT
1/2"	30.5	21.54	21.23	22.22	13	9	50	19	36	38	14
3/4"	35	26.87	26.57	25.4	17	9	50	15	41	43	14
1"	44	33.65	33.27	28.58	23	9	55	16.5	50	53	11
1-1/4"	54	42.42	42.04	31.75	29.5	9	61	19	60	63	11
1-1/2"	60	48.56	48.11	34.93	37	9	64	19	65	68	11
2"	73	60.63	60.17	38.1	48	10	70.5	20.5	80	83	11
2-1/2"	88	73.38	72.85	44.45	57	11.5	90	32	95	100	11
3"	105	89.31	88.70	47.63	72	14	94.5	32	115	122	11
4"	132	114.76	114.1	57.15	96	14	109.5	38	145	154	11

(unit : mm)



SCH 80 UPVC Reducer Tee (Slip×Slip×Slip)

Size	Outside Dia		Socket Type						Structure Diameter			
	D1	D2	d1	d2	l1	d3	d4	l2	L	H	d	d0
3/4"X3/4"X1/2"	37	32	26.87	26.57	25.4	21.54	21.23	22.22	88	38.5	22	16.5
1"X1"X1/2"	44	30	33.65	33.27	28.58	21.54	21.23	22.22	97	41	28	16.5
1"X1"X3/4"	46	32	33.65	33.27	28.58	26.87	26.57	25.4	97	44	28	22
1"X1"X2"	44	73	33.65	33.27	28.58	60.63	60.17	38.1	97	65	28	28
1-1/4"X1-1/4"X1/2"	57	32	42.42	42.04	31.75	21.54	21.23	22.2	116	44.5	35	16.5
1-1/4"X1-1/4"X3/4"	57	37	42.42	42.04	31.75	26.87	26.57	25.4	116	48	35	22
1-1/4"X1-1/4"X1"	57	46	42.42	42.04	31.75	33.65	33.27	28.58	116	52	35	28
1-1/2"X1-1/2"X1/2"	62	32	48.56	48.11	34.93	21.54	21.23	22.22	128.5	48.5	43	16.5
1-1/2"X1-1/2"X3/4"	62	37	48.56	48.11	34.93	26.87	26.57	25.4	128.5	52	43	22
1-1/2"X1-1/2"X1"	62	48	48.56	48.11	34.93	33.65	33.27	28.58	128.5	55.5	43	28
1-1/2"X1-1/2"X1-1/4"	62	56	48.56	48.11	34.93	42.42	42.04	31.75	128.5	60	43	35
2"X2"X1/2"	76	32.5	60.63	60.17	38.1	21.54	21.23	22.22	146	54	54	16.5
2"X2"X3/4"	76	37	60.63	60.17	38.1	26.87	26.57	25.4	146	57.5	54	22
2"X2"X1"	76	46	60.63	60.17	38.1	33.65	33.27	28.58	146	60.5	54	28
2"X2"X1-1/4"	76	56	60.63	60.17	38.1	42.42	42.04	31.75	146	65	54	35
2"X2"X1-1/2"	76	62	60.63	60.17	38.1	48.56	48.11	34.93	146	69	54	43
2-1/2"X2-1/2"X1"	91	46	73.38	72.85	44.45	33.65	33.27	28.58	171	67.5	65	28
2-1/2"X2-1/2"X1-1/4"	91	54	73.38	72.85	44.45	42.42	42.04	31.75	171	72	65	35
2-1/2"X2-1/2"X1-1/2"	91	62	73.38	72.85	44.45	48.56	48.11	34.93	171	75.5	65	43
2-1/2"X2-1/2"X2"	91	75	73.38	72.85	44.45	60.63	60.17	38.1	171	79	65	54
3"X3"X1"	107	46	89.31	88.7	47.63	33.65	33.27	28.58	196	77.5	80	28
3"X3"X1-1/4"	107	56	89.31	88.7	47.63	42.42	42.04	31.75	196	77.5	80	35
3"X3"X1-1/2"	107	62	89.31	88.7	47.63	48.56	48.11	34.93	196	82	80	43
3"X3"X2"	107	75	89.31	88.7	47.63	60.63	60.17	38.1	196	86.5	80	54
3"X3"X2-1/2"	107	91	89.31	88.7	47.63	73.38	72.85	44.45	196	95	80	65
4"X4"X1"	133	46	114.76	114.1	57.15	33.65	33.27	28.58	237.5	89.5	100	28
4"X4"X1-1/4"	133	57	114.76	114.1	60.15	42.42	42.04	31.75	237.5	90.5	100	38
4"X4"X1-1/2"	133	64	114.76	114.1	57.15	48.56	48.11	34.93	237.5	97	100	43
4"X4"X2"	133	75	114.76	114.1	57.15	60.63	60.17	38.10	237.5	96	100	54
4"X4"X2-1/2"	133	91	114.76	114.1	57.15	73.38	72.85	44.45	237.5	104	100	65
4"X4"X3"	133	107	114.76	114.1	57.15	89.31	88.7	47.63	237.5	110	100	80
5"X5"X2"	163	75	141.81	141	66.68	60.63	60.17	38.10	298	114.5	132	54
6"X6"X1"	191	45	168.83	168	76.2	33.65	33.27	28.58	336.5	115	150	29
6"X6"X1-1/4"	191	54	168.83	168	76.2	42.42	42.04	31.75	336.5	120	150	38
6"X6"X1-1/2"	191	60.5	168.83	168	76.2	48.56	48.11	34.93	336.5	123	150	44
6"X6"X2"	191	73	168.83	168	76.2	60.63	60.17	38.10	336.5	125	150	54
6"X6"X2-1/2"	191	89	168.83	168	76.2	73.88	72.85	44.45	336.5	130	150	65
6"X6"X3"	191	105	168.83	168	76.2	89.31	88.7	47.63	336.5	135	150	80
6"X6"X4"	191	132	168.83	168	76.2	114.76	114.1	57.15	336.5	145	150	100
8"X8"X2"	246	75	219.84	218.69	101.6	60.63	60.17	38.1	439	151	200	54
8"X8"X2-1/2"	246	89	219.84	218.69	101.6	73.38	72.85	44.45	439	157.25	200	65
8"X8"X3"	246	105	219.84	218.69	101.6	89.31	88.7	47.63	439	160	200	80
8"X8"X4"	246	132	219.84	218.69	101.6	114.76	114.1	57.15	439	170	200	100
8"X8"X6"	246	191	219.84	218.69	101.6	168.83	168	76.20	439	194	200	150
10"X10"X2"	307	74	273.81	272.67	127	60.63	60.17	38.1	560	185	265	54
10"X10"X3"	307	107	273.81	272.67	127	89.31	88.7	47.63	560	194	265	80
10"X10"X4"	307	134	273.81	272.67	127	114.76	114.1	57.15	560	205	265	100
10"X10"X6"	307	193	273.81	272.67	127	168.83	168	76.2	560	225	265	160
10"X10"X8"	307	248	273.81	272.67	127	219.84	218.69	101.6	560	250	265	210
12"X12"X2"	364	74	324.61	323.47	152.4	60.63	60.17	38.1	660	215	315	54
12"X12"X3"	364	108	324.61	323.47	152.4	89.31	88.7	47.63	660	225	315	80
12"X12"X4"	364	136	324.61	323.47	152.4	114.76	114.1	57.15	660	235	315	100
12"X12"X6"	364	195	324.61	323.47	152.4	168.83	168	76.2	660	255	315	160
12"X12"X8"	364	248	324.61	323.47	152.4	219.84	218.69	101.6	660	280	315	210
12"X12"X10"	364	308	324.61	323.47	152.4	273.81	272.67	127	660	298	315	265
14"X14"X4"	396.5	133	356.49	355.22	*205	114.76	114.1	57.15	856.5	290	346	100
14"X14"X6"	396.5	192	356.49	355.22	*205	168.83	168	76.2	856.5	310	346	144
14"X14"X8"	396.5	246	356.49	355.22	*205	219.84	218.69	101.6	856.5	339	346	200
14"X14"X10"	396.5	307	356.49	355.22	*205	273.81	272.67	127	856.5	365	346	259
14"X14"X12"	396.5	364	356.49	355.22	*205	324.61	323.47	152.4	856.5	390	346	308

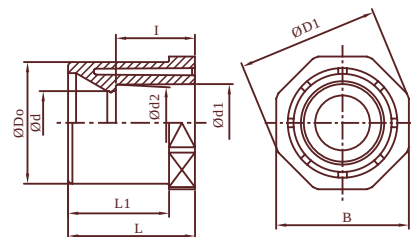


Note : Do not comply with ASTM standards, if mark with *.

(unit : mm)

SCH 80 UPVC Reducer Bushing (Spig×Slip)

Size	Outside Dia	Socket Type			Structure Diameter				
	D0	d1	d2	l	d	L	L1	D1	B
1/2"X1/4"	21.34	14.02	13.61	19	11	29	23	31	30
1/2"X3/8"	21.34	17.45	17.04	22	12	29	23	31	30
3/4"X1/2"	26.67	21.54	21.23	24	13	33	27	31	30
1"X3/8"	33.4	17.45	17.04	24	12	38	30	39.4	38
1"X1/2"	33.4	21.54	21.23	24	12	38	30	39.4	38
1"X3/4"	33.4	26.87	26.57	26	18	38	30	39.4	38
1-1/4"X1/2"	42.16	21.54	21.23	24.2	16.5	44	35	52	50
1-1/4"X3/4"	42.16	26.87	26.57	26	21	44	35	52	50
1-1/4"X1"	42.16	33.65	33.27	29.5	28	44	35	52	50
1-1/2"X1/2"	48.26	21.54	21.23	24.2	16.5	47	38	58	55
1-1/2"X3/4"	48.26	26.87	26.57	26	21	47	38	58	55
1-1/2"X1"	48.26	33.65	33.27	29.5	28	47	38	58	55
1-1/2"X1-1/4"	48.26	42.42	42.04	32.5	35	47	38	58	55
2"X1/2"	60.33	21.54	21.23	24.2	16.5	52	42	68	65
2"X3/4"	60.33	26.87	26.57	26	21	52	42	68	65
2"X1"	60.33	33.65	33.27	29.5	28	52	42	68	65
2"X1-1/4"	60.33	42.42	42.04	32.5	35	52	42	68	65
2"X1-1/2"	60.33	48.56	48.11	35.5	43	52	42	68	65
2-1/2"X1-1/4"	73.03	42.42	42.04	32.5	36	60	48.5	85	80
2-1/2"X1-1/2"	73.03	48.56	48.11	35.5	43	60	48.5	85	80
2-1/2"X2"	73.03	60.63	60.17	39.1	52	60	48.5	85	80
3"X1"	88.9	33.65	33.27	30.5	28	65	51	105	99
3"X1-1/2"	88.9	48.56	48.11	35.5	43	65	51	105	99
3"X2"	88.9	60.63	60.17	39.1	54	65	51	105	99
3"X2-1/2"	88.9	73.38	72.85	47.5	65	65	51	105	99
4"X1"	114.3	33.65	33.27	30.5	28	75	60.5	132	125
4"X2"	114.3	60.63	60.17	41.1	54	75	60.5	132	125
4"X2-1/2"	114.3	73.38	72.85	47.5	65	75	60.5	132	125
4"X3"	114.3	89.31	88.7	50.6	80	75	60.5	132	125
5"X4"	141.3	114.76	114.1	60.2	100	84	69.6	150	145
6"X2"	168.28	60.63	60.17	41.1	51	90	76.5	191	180
6"X3"	168.28	89.31	88.7	50.6	80	90	76.5	191	180
6"X4"	168.28	114.76	114.1	60.2	105	90	76.5	191	180
6"X5"	168.28	141.81	141	69.6	125	90	76.5	191	180
8"X4"	219.1	114.76	114.1	60.5	105	120	104.6	246	235
8"X6"	219.1	168.83	168	79	150	120	104.6	246	235
10"X3"	273.05	89.31	88.7	50.6	80	148	130	290	280
10"X4"	273.05	114.76	114.1	60.2	105	148	130	290	280
10"X6"	273.05	168.83	168	79.2	150	148	130	290	280
10"X8"	273.05	219.84	218.69	105	200	148	130	290	280
12"X4"	323.85	114.76	114.1	60.2	100	175	155	345	330
12"X6"	323.85	168.83	168	79.2	150	175	155	345	330
12"X8"	323.85	219.84	218.69	105	200	175	155	345	330
12"X10"	323.85	273.81	272.67	130	245	175	155	345	330
14"X10"	355.6	273.81	272.67	130	245	200	180	380	360
14"X12"	355.6	324.61	323.47	135	300	200	180	380	360

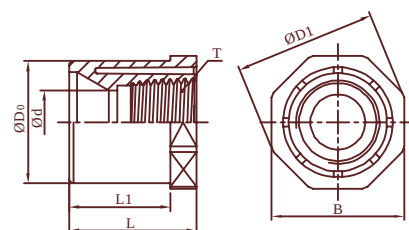


(unit : mm)

SCH 80 UPVC Reducer Bushing (Spig×NPT)

Size	Outside Dia		Structure Diameter				
	D0	d	L	L1	B	D1	NPT(thd./in)
1/2"X1/4"	21.34	11	29	23	30	31	18
1/2"X3/8"	21.34	12	29	23	30	31	18
3/4"X1/2"	26.67	13	33	27	30	31	14
1"X3/8"	33.4	12	38	30	38	39.4	18
1"X1/2"	33.4	12	38	30	38	39.4	14
1"X3/4"	33.4	18	38	30	38	39.4	14

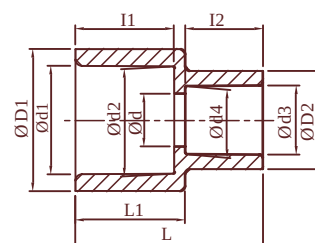
(unit : mm)



SCH 80 UPVC Reducer Coupling (Slip×Slip)

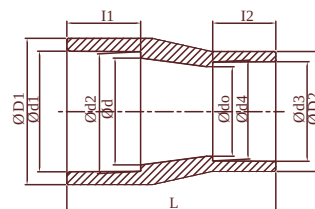
Size	Outside Dia		Socket Type						Structure Diameter		
	D1	D2	d1	d2	l1	d3	d4	l2	d	L	L1
3/4" X 1/2"	37	30.5	26.87	26.57	25.4	21.54	21.23	22.22	16.5	57.5	30
1" X 1/2"	47	30.5	33.65	33.27	28.58	21.54	21.23	22.22	16.5	58	36
1" X 3/4"	47	35	33.65	33.27	28.58	26.87	26.57	25.4	21	61	36
1-1/4" X 1/2"	55.5	30.5	42.42	42.04	31.75	21.54	21.23	22.22	16.5	62.5	42
1-1/4" X 3/4"	55.5	35	42.42	42.04	31.75	26.87	26.57	25.4	21	65	42
1-1/4" X 1"	55.5	44	42.42	42.04	31.75	33.65	33.27	28.58	28	68.5	42
1-1/2" X 1/2"	63	30.5	48.56	48.11	34.93	21.54	21.23	22.22	16.5	65	44
1-1/2" X 3/4"	63	35	48.56	48.11	34.93	26.87	26.57	25.4	21	68	44
1-1/2" X 1"	63	44	48.56	48.11	34.93	33.65	33.27	28.58	28	71	44
1-1/2" X 1-1/4"	63	54	48.56	48.11	34.93	42.42	42.04	31.75	35	75	44
2" X 1/2"	75	30.5	60.63	60.17	38.1	21.54	21.23	22.22	16.5	68	49.5
2" X 3/4"	75	35	60.63	60.17	38.1	26.87	26.57	25.4	21	71	49.5
2" X 1"	75	44	60.63	60.17	38.1	33.65	33.27	28.58	28	74.5	49.5
2" X 1-1/4"	75	54	60.63	60.17	38.1	42.42	42.04	31.75	35	78.5	49.5
2" X 1-1/2"	75	60	60.63	60.17	38.1	48.56	48.11	34.93	42.5	82.5	49.5

(unit : mm)



Size	Outside Dia		Socket Type						Structure Diameter		
	D1	D2	d1	d2	l1	d3	d4	l2	d	d0	L
2-1/2" X 1"	89	44	73.38	72.85	44.45	33.65	33.27	28.58	65	27.5	117.5
2-1/2" X 1-1/2"	89	61	73.38	72.85	44.45	48.56	48.11	34.93	65	42.5	124
2-1/2" X 2"	89	73	73.38	72.85	44.45	60.63	60.17	38.10	65	54.5	127
3" X 1-1/2"	106	61	89.31	88.70	47.63	48.56	48.11	34.93	81	42.5	136
3" X 2"	106	73	89.31	88.70	47.63	60.63	60.17	38.10	81	54.5	140
3" X 2-1/2"	106	89	89.31	88.70	47.63	73.38	72.85	44.45	81	65	147
4" X 2"	133.5	73	114.76	114.10	57.15	60.63	60.17	38.10	-	54.5	158.5
4" X 2-1/2"	133.5	89	114.76	114.10	57.15	73.38	72.85	44.45	-	65	158.5
4" X 3"	133.5	106	114.76	114.10	57.15	89.31	88.70	47.63	-	81	158.5

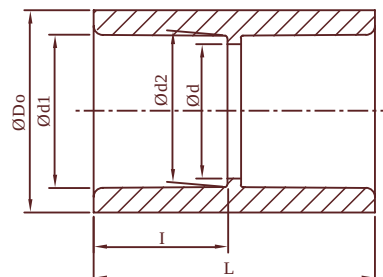
(unit : mm)



SCH 40 UPVC Fittings

SCH 40 UPVC Coupling (Slip×Slip)

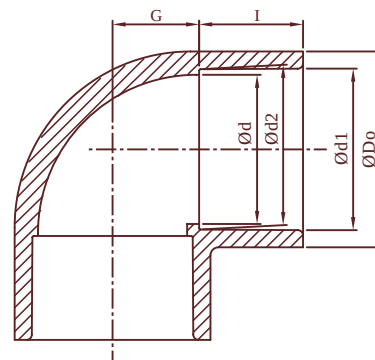
Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	l	d	L
1/2"	27.5	21.54	21.23	17.8	18	38.6
3/4"	33.5	26.87	26.57	18.7	22.5	40.5
1"	41.7	33.65	33.27	22.7	29	48.5
1-1/4"	50.5	42.42	42.04	24.3	38	57.5
1-1/2"	56.8	48.56	48.11	28.3	43.5	60
2"	69	60.63	60.17	29.9	55.5	63.5
2-1/2"	84.2	73.38	72.85	45	67.5	95
3"	100.8	89.31	88.70	48.1	83.5	101.2
4"	127.3	114.76	114.07	51.3	108.5	107.6



Note : Do not comply with ASTM standards, if mark with *. (unit : mm)

SCH 40 UPVC 90° Elbow (Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	l	d	G
1/2"	27.5	21.54	21.23	17.8	18	12.7
3/4"	33.6	26.87	26.57	18.7	22.5	14.8
1"	41.7	33.65	33.27	22.7	29	18.3
1-1/4"	50.5	42.42	42.04	24.3	38	22.7
1-1/2"	56.8	48.56	48.11	28.3	43.5	25.7
2"	69	60.63	60.17	29.9	55	32
2-1/2"	84.2	73.38	72.85	45	67.5	39
3"	100.8	89.31	88.70	48.1	83.5	46.5
4"	127.3	114.76	114.07	51.3	108.5	59.7
16"	434.5	407.58	405.87	*205	376	240

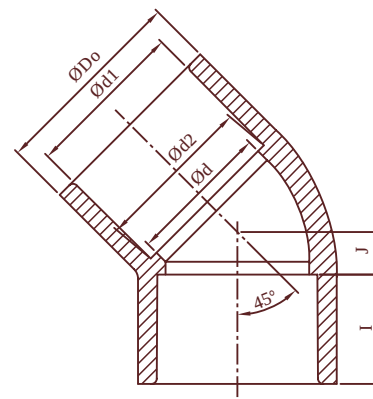


Note : Do not comply with ASTM standards, if mark with *. (unit : mm)

SCH 40 UPVC 45° Elbow (Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter	
	D0	d1	d2	l	d	J
1/2"	27.5	21.54	21.23	17.8	18	6.4
3/4"	33.1	26.87	26.57	18.7	22.5	8
1"	40.9	33.65	33.27	22.7	29	8
1-1/4"	50.1	42.42	42.04	24.3	38	9.6
1-1/2"	56.5	48.56	48.11	28.3	43.5	11.2
2"	69	60.63	60.17	29.9	55	16
2-1/2"	84.2	73.38	72.85	45	67.5	18
3"	100.8	89.31	88.70	48.1	83.5	20
4"	127.3	114.76	114.07	51.3	108.5	25.4
16"	434.5	407.58	405.87	*205	376	120

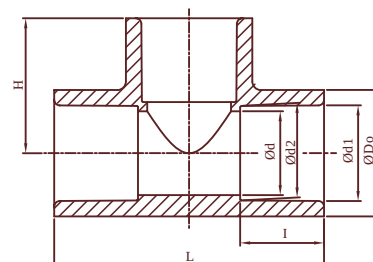
Note : Do not comply with ASTM standards, if mark with *. (unit : mm)



SCH 40 UPVC Tee (Slip×Slip×Slip)

Size	Outside Dia	Socket Type			Structure Diameter		
	D0	d1	d2	l	d	L	H
1/2"	27.5	21.54	21.23	17.8	18	61	30.5
3/4"	33.6	26.87	26.57	18.7	22.5	67	33.5
1"	41.7	33.65	33.27	22.7	29	82	41
1-1/4"	50.5	42.42	42.04	24.3	38	94	47
1-1/2"	56.8	48.56	48.11	28.3	43.5	108	54
2"	69	60.63	60.17	29.9	55	124	62
2-1/2"	84.2	73.38	72.85	45	67.5	168	84
3"	100.8	89.31	88.70	48.1	83.5	189.2	94.6
4"	127.3	114.76	114.07	51.3	108.5	222	111
16"	434.5	407.58	405.87	*205	376	890	445

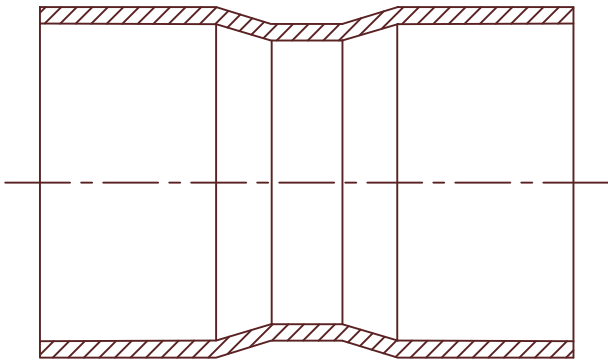
Note : Do not comply with ASTM standards, if mark with *. (unit : mm)



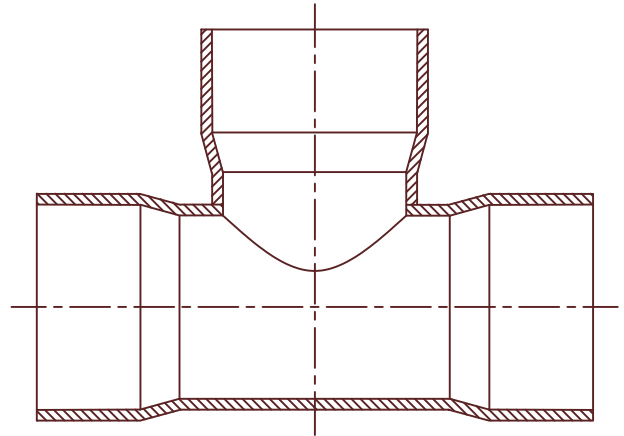
Note :

- 1.All of Hershey Valves molded fittings meet ASTM standards in dimension and performance. While their dimensions complying with ASTM standards, Hershey Valve reserves the right to change or modify their designs without further notice.
- 2.Data shown in the tables are typical values which meet ASTM standards. For detail information of ASTM values, please see ASTM 2464, 2466 and 2467.

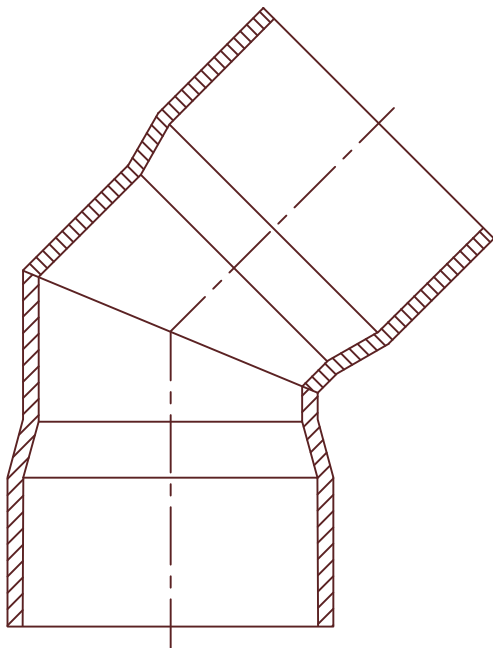
Fabricated UPVC Fittings

Coupling

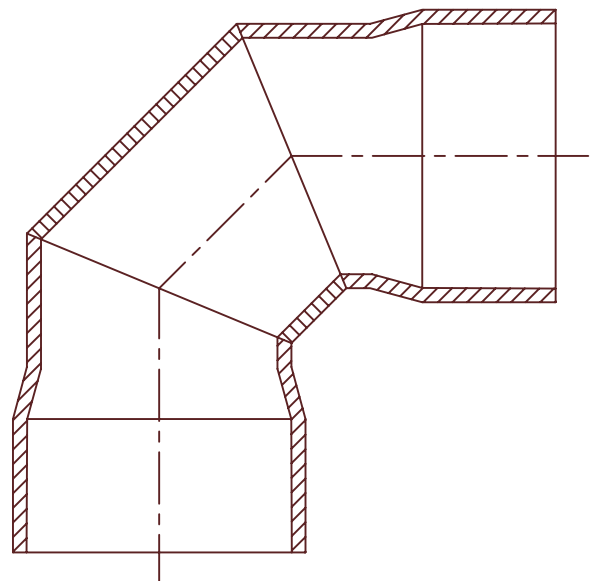
Size : 14"~24"

Tee

Size : 14"~24"

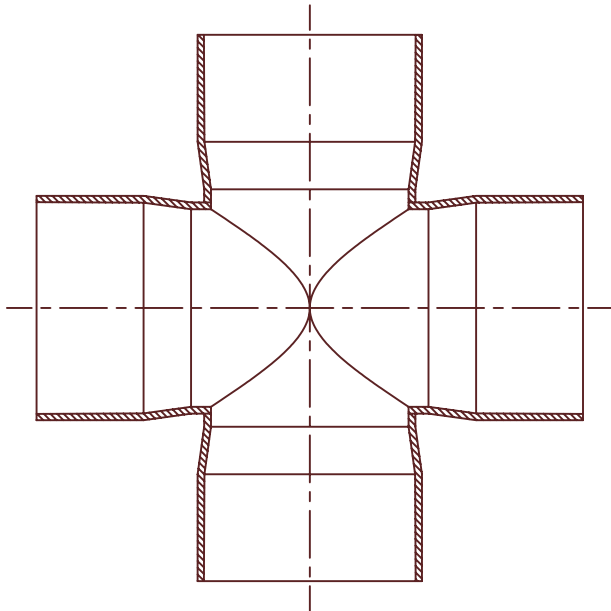
45°Elbow

Size : 14"~24"

90°Elbow

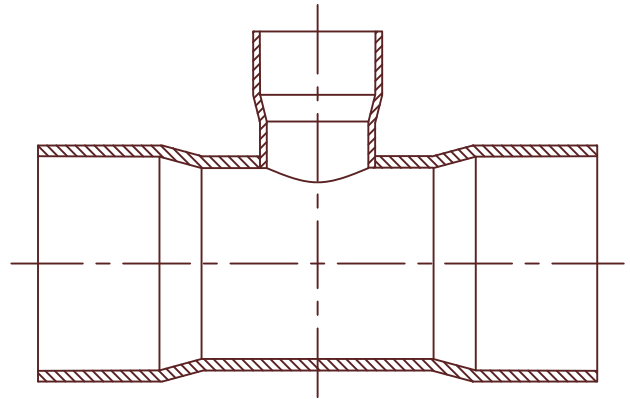
Size : 14"~24"

Cross



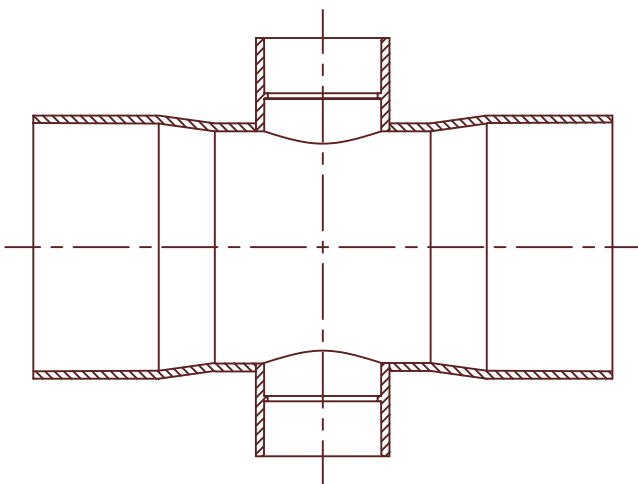
Size : 8"~24"

Reducer Tee



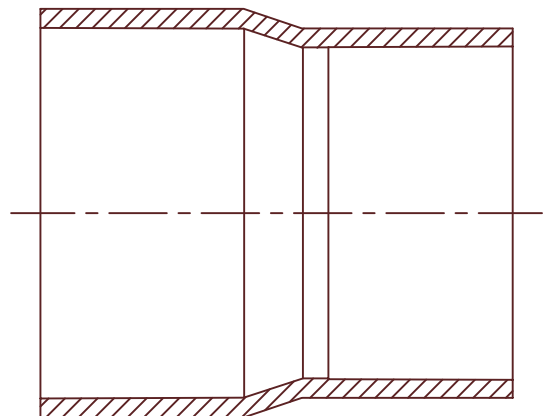
Size : 12" ~ 24"

Reducer Cross



Size : 8"~24"

Reducer Coupling



Size : 6"~24"

Note : Fabricated fittings are custom made items and they are available upon request.



CPVC Advanced
Industrial Piping System
CPVC工業管路系統



Thermoplastic Valves
塑膠閥門(凡而)



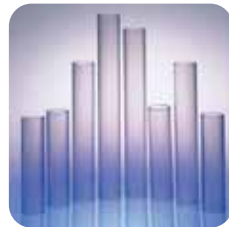
UPVC Industrial Piping System
UPVC工業管路系統



CPVC High Performance
Fire Sprinkler System
CPVC高效能消防管路系統



PVC-M1 Cable Tray
防火耐燃電纜線槽



Clear PVC Piping System
PVC透明管路系統



CPVC/HT-PVC Sheet
CPVC / HT-PVC板材



CPVC Hot & Cold water Distribution System
CPVC 熱水管道系統



鑾琪塑膠股份有限公司
Hershey Valve Co., Ltd.

435 台中市梧棲區鎮經二路16號

No.16, Jing 2nd Rd., Wuchi, Taichung, 435 Taiwan, R.O.C.

Tel : +886-4-2659 5377 Fax : +886-4-2659 5288

Http : //www.hershey.com.tw

E-mail : info@hershey.com.tw

