1. uPVC PRESSURE PIPE SYSTEM FOR POTABLE WATER DISTRIBUTION

1.1 GENRAL FEATURES

1. CORROSION FREE

Anton pipes resist both acid and alkali, so they can be used without fear of corrosion.

2. LIGHT AND RIGID

uPVC pipe weigh only 1/5.5 of iron and also their tensile strength is 1/3 of iron. The following table shows the comparative data between the Anton pipe and other materials.

Table 1.1

MATERIALS	SPECIFIC GRAVITY	TENSILE STRENGTH
uPVC PIPE	1.40 - 1.45	5 - 6 g/mm^2
IRON	7.85	18 - 25 g/mm^2
RUBBER	0.97 - 1.06	1.7 - 2.5 g/mm^2

3. CONSTANT WATER FLOW

The internal surfaces of Anton pipes are smooth, which minimize flow loss and prevent to deposit impedes.

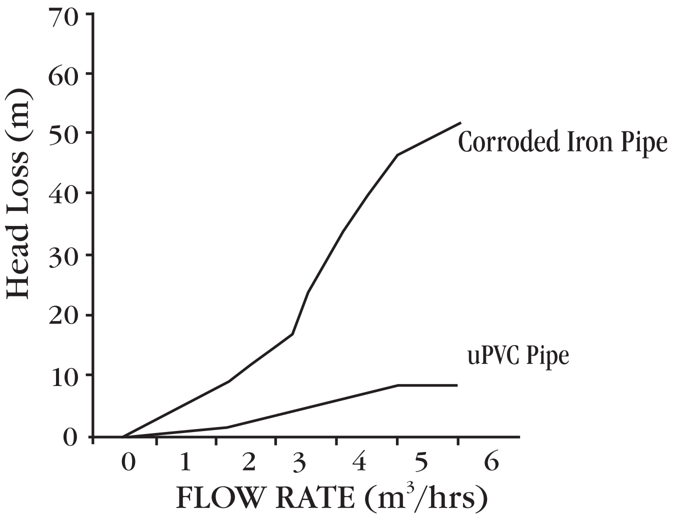


Fig 1-1

4. SAFE FROM ELECTRIC SHOCK

Anton pipes have the superior physical properties of low electrical conductivity and high dielectric strength; therefore; they are free from the fear of electric shock, and are suitable far electric conduits.

Table 1.2

DIELECTRIC STRENGTH kv/mm	uPVC PIPE	MICA	PORCELAIN	EBONITE
	28-50	15-78	8-25	10-70

5. NON-INFLAMMABLE

Anton pipes do not support combustion and are fire proof since they are self extinguishing.

6. LOW HEAT CONDUCTIVITY

Since Anton pipes have low heat conductivity, the heat adsorption and heat dispersion of water inside the pipe is minimal..
The recommended water temperature for ANTON pipes is + 1°C to +45°C

7. EASY HANDLING AND INSTALLATION

Since Anton pipes soften at a temperature of about 83 ^{0}C, bending by heat and connecting the pipes with solvent cement can be done freely without any loss in performance.

1.2 PHYSICAL CHARACTERISTICS OF ANTON uPVC PIPES

Table 1.3

CHARACTERISTICS	VALUE	SLS STANDARD	RELETED INTERNATIONAL STANDARD
Density	1350kg/m^3 - 1460kg/m^3	SLS 147 : 2013	ISO 1183-1:2012
Vicat Softening Temperature	80 ^{0} C (min)	SLS 147 : 2013	ISO 2507-1 : 1995
Opacity	0.2 % (max)	SLS 147 : 2013	ISO 7686:2005
Resistance to Internal Pressure		SLS 147 : 2013	ISO 1167 : 2006
Resistance to Acetone		SLS 147 : 2013	ISO 9852:2007
Effect of materials on water quality	Lead (Pb) 0.01 mg/L (max)	SLS 147 : 2013	WHO 1996 - Drinking Water Guide Lines ISO 3114:1997
Resistance to external Blows		SLS 147 : 2013	BS EN 744
Longitudinal reversion test	5 % (max)	SLS 147 : 2013	ISO 2505: 2005
Resistance to Dichloromethane test		SLS 147 : 2013	ISO 9852:2017

Note : SLS **147 : 2013 Third Revision**

1.3 APPLICATIONS

1. POTABLE COLD WATER SUPPLY

Manufactured to Sri Lanka Standards(3RD REVISION OF SLS 147 :2013) and international specifications (ISO), Anton uPVC pipes and fittings are ideally suited for use in Public, Industrial and Domestic Water Schemes where low cost, easy handling, transportation and installation are prime considerations.

2. CHEMICAL PLANTS, MINES, PETROLEUM FIELDS

Anton pipes and fittings are non corrosive and resistant to the chemical action of wide range of acids, alkalis, fats, salts and other corrosive fluids. This makes the use of Anton pipes in chemical and other processing plants which use acids, alkalis, salts and other chemicals a prime application.

3. ELECTRICAL CONDUIT

It's resistance to electricity, together with its lightness and durability make Anton conduit pipes and accessories ideal for use as conduit for electrical wiring in domestic and industrial applications.

4. VENTILATION PIPING

Anton is an ideal conveyor of corrosive gases which cannot be done with metal pipes.

5. DRAINAGE

ANTON Pipes are suitable to meet the requirements of Drainage and Sewerage plumbing systems too.

6. SANITATION PIPING

Anton pipes can be used for the underground evacuation of wastes in sanitary schemes. Its smooth inner surface ensures free flow of liquid together with its high tensile strength, burst pressure and resistance to chemical action make it ideal for such use.

7. AGRICULTURAL PIPING

Non corrosive, light and with a smooth inner surface Anton pipes are ideal for the piping of irrigation water in agricultural farms.

8. TUBE WELL PIPING

The use of Anton pipes in tube wells and for the lifting of underground water from artesian basins is another economic application in preference to pipes of other material.

9. AQUA FARM PIPING

Anton pipes have an useful application in hatcheries and large tanks in inland fisheries.

10. SALT FARM PIPING

Anton is an ideal carrier of salt water and is well suited for installation where there is regular exposure to sea water.

11. CLASS PIPES

Anton class pipes one another economic application for customer requirement

1.4 DIMENSIONS OF PRESSURE PIPES

PVC PIPE SIZES FOR WATER SUPPLY AND BURIED AND ABOVE GROUND DRAINAGE AND SEWERAGE UNDER PRESSURE AS PER NEW SLS 147:2013 STANDARD

Table 1.4

	S 16		S 12.5		S 10		S 8		S 6.3	
	Nominal pressure PN based on design coefficient C=2.5									
			PN 8	PN_T 7	PN 10	PN_T 9	PN 12.5	PN_T 11	PN 16	PN_T 14
20									1.5 - 1.9	
25							1.5 - 1.9			
32			1.5 - 1.9		1.6 - 2.0		1.9 - 2.3			
40			1.6- 2.0		1.9 - 2.3		2.4 - 2.9			
50			2.0 - 2.4		2.4 - 2.9		3.0 - 3.5			
63			2.5 - 3.0		3.0 - 3.5		3.8 - 4.4			
75			2.9 - 3.4		3.6 - 4.2		4.5 - 5.2			
90			3.5 - 4.1		4.3 - 5.0		5.4 - 6.2			
	Nominal pressure PN based on design coefficient C=2.0									
	PN 8	PN_T 7	PN 10	PN_T 9	PN 12.5	PN_T 11	PN 16	PN_T 14		
110	3.4 - 4.0		4.2 - 4.9		5.3 - 6.1					
140	4.3 - 5.0		5.4 - 6.2		6.7 - 7.6					
160	4.9 - 5.6		6.2 - 7.1		7.7 - 8.7					
225	6.9 - 7.8		8.6 - 9.7		10.8 - 12.1					
280	8.6 -9.7				13.4 -15.0					
315	9.7 -10.9				15.0 - 16.7					

PN - Nominal pressure
PN_T - Nominal allowable pressure at 30 ^{0} C

PN_T7 - (PN 8, 8.2 Kgf cm^2, 116.0 1bf/in^2,267.6ft, head)
PN_T9 - (PN 10,10.2 Kgf cm^2, 145.0 1bf/in^2,334.5ft, head)
PN_T11 - (PN 12.5, 12.7 Kgf cm^2, 181.2 1bf/in^2,418.1ft, head)
PN_T14 - (PN 16, 16.3 Kgf cm^2, 232.0 1bf/in^2,535.3ft, head)

2. SPECIFICATIONS FOR THE DESIGNING OF uPVC PRESSURE PIPE SYSTEMS

2.1 THERMAL EXPANSION / CONTRACTION

When installing a pipe system in plastic materials such as uPVC, it is necessary to keep in mind the linear expansion or contraction caused by changes in temperature. In uPVC pipes the linear coefficient of expansion or contraction is approximately 0.074823 mm per metre of pipe and for every 1°C of thermal variation.

The expansion or contraction can be calculated with the formula :

$$\Delta L = \alpha \times L \times \Delta t$$

Where ΔL = expansion in mm

α = linear coefficient of expansion or contraction in mm/metre per °C

L = length of tube in metres

Δt = thermal variation in °C

For a rapid calculation of the expansion consult Table 2.1 of Page 6

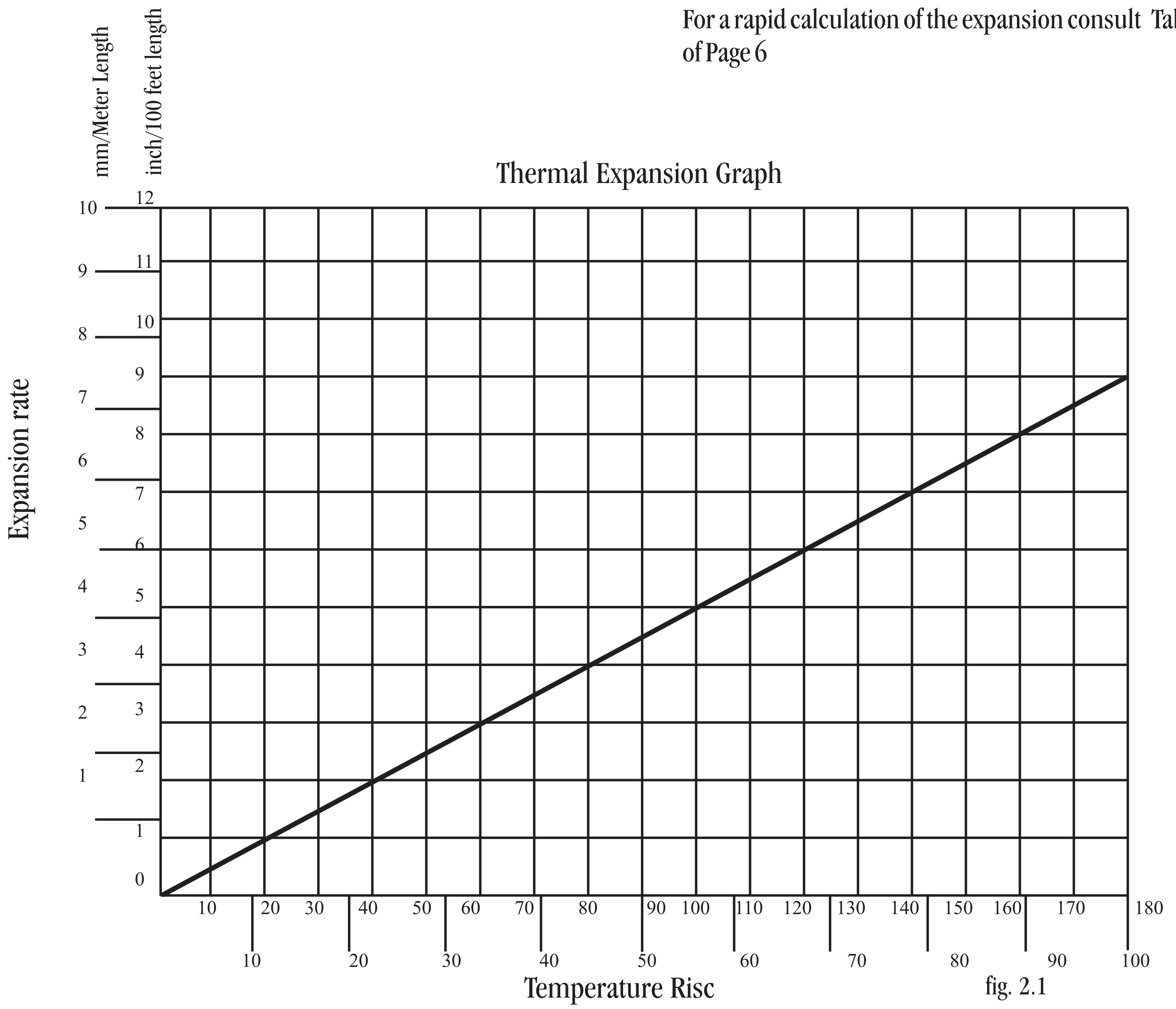
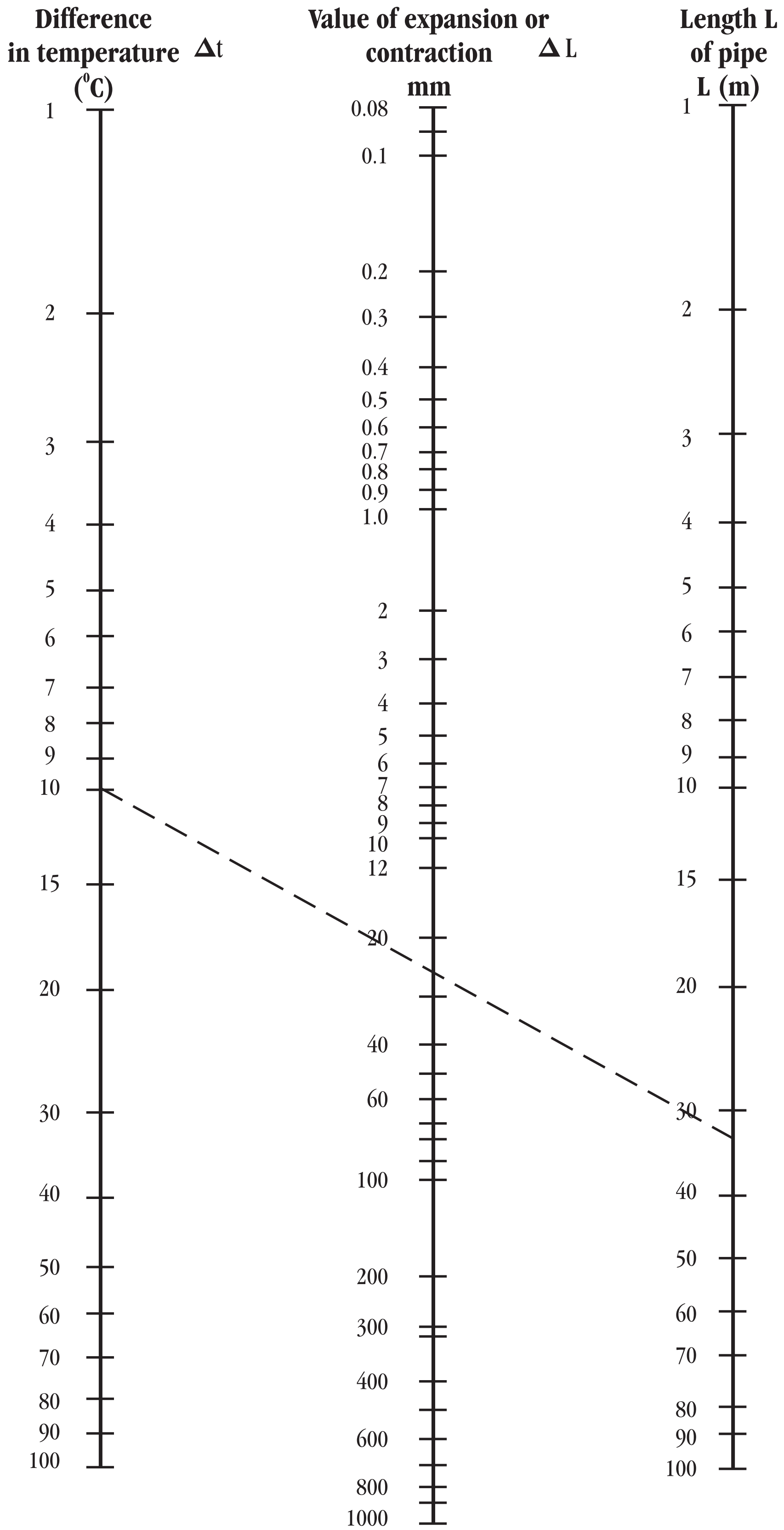


fig. 2.1

Table 2.1

TEMPERATURE GRADIENT (ΔL) AS A FUNCTION OF THE LENGTH (L) IN METRE LENGTHS OF PIPE AND OF THE THERMAL VARIATIONS (ΔT) IN °C



Example:
Data L = 35m and Δt = 10°C
Join with a straight line the length of pipe L= 35 m with the difference of temperature Δt = 10° C
The point of intersection with the line of expansion corresponds to the value of the pipe length variation ΔL = 26 mm.

LINEAR EXPANSION

u PVC Pipes have a high coefficient of thermal expansion and inherent flexible characteristics that allow them to absorb in part the stresses caused by elongation. It is recommended however, that adequate steps as described below be taken to guarantee a greater efficiency of the System.

To compensate for linear expansion (which has been previously calculated) and for additions or a change in direction in the system, as indicated in the fig 2.2 of page 8 it is necessary to determine the minimum distance (x) at which supports should be fixed or changes in direction made to guard against excessive stresses which might damage the Pipes.

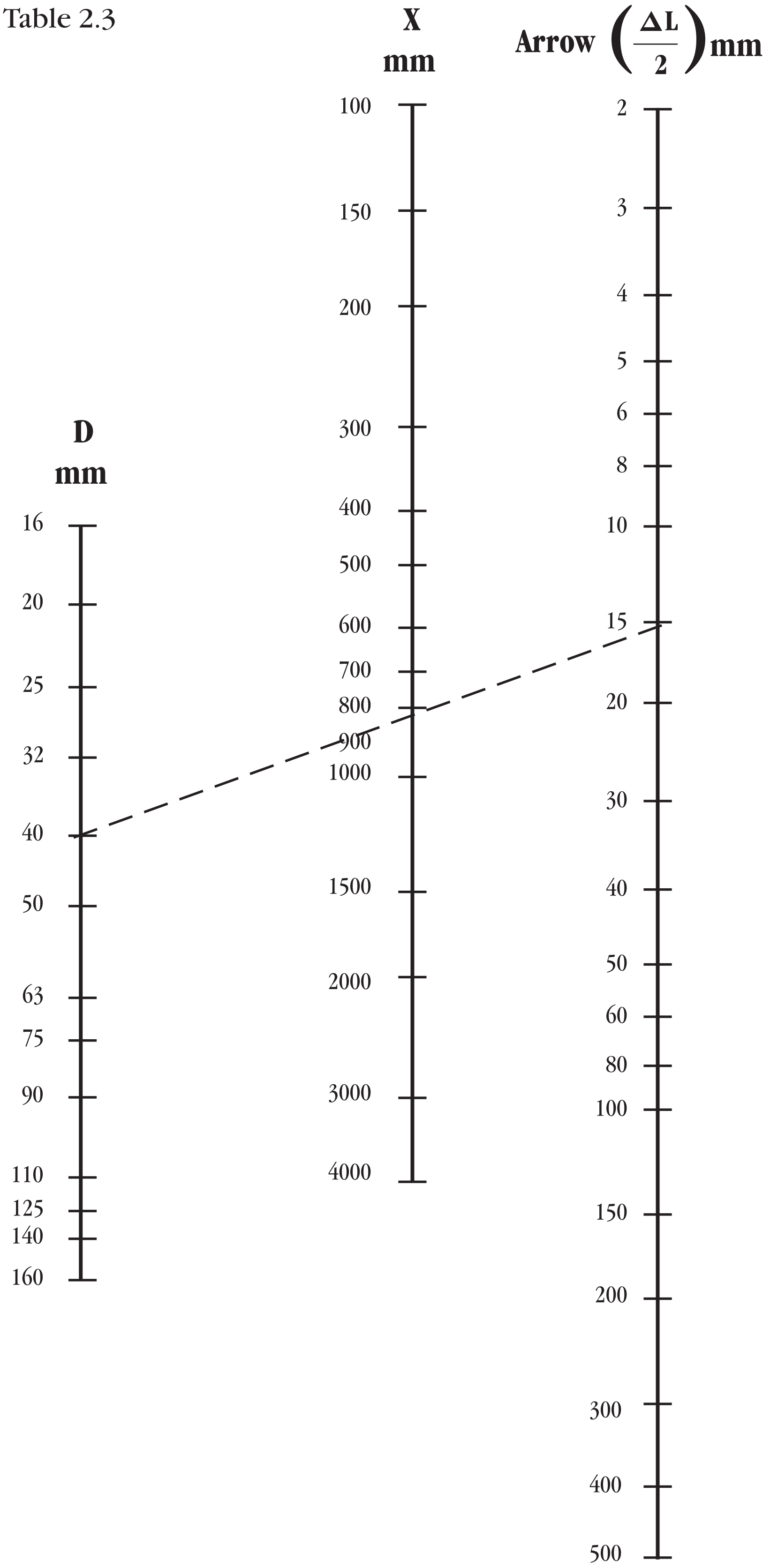
For rapid calculation of point x consult Table 2.3 of page 8

The Pipe must also be free to expand or contract without impediment: ther fore the supports used must permit free expansion and contraction. In horizontal pipes the distance between supports must be such that the arrow in the pipe, in respect of weight and the temperature of the liquid transported, should not go over the permitted value . (See Table 2.2 below.)

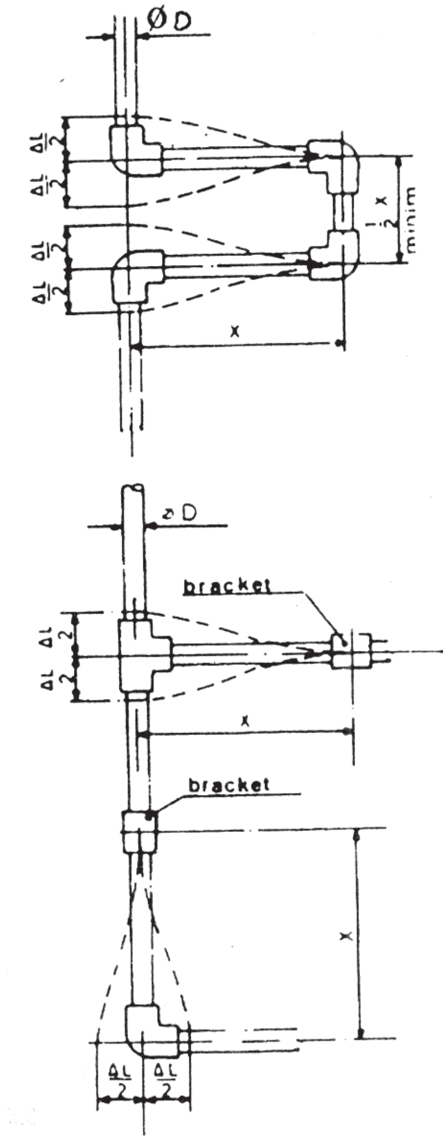
Table 2.2

MAXIMUM DISTANCE IN cm TO BE KEPT BETWEEN SUPPORTS						
Coupling Ø	uPVC					
	PNт7 / PNт9			PNт11 / PNт14		
	0 - 20° C	20 - 40° C	40 - 60° C	0 - 20° C	20 - 40° C	40 - 60° C
20 (1/2")	-	-	-	130	110	75
25 (3/4")	-	-	-	140	120	80
32 (1")	150	130	85	150	130	85
40 (11/4")	150	130	85	160	140	90
50 (11/2")	150	135	85	165	145	95
63 (2")	155	140	90	170	150	100
75 (21/2")	160	145	95	190	170	110
90 (3")	165	150	100	200	180	120
110 (4")	170	155	105	210	195	125
160 (6")	185	170	120	240	225	140

Table 2.3



TO FIND THE VALUE of 'X' AS A FUNCTION OF THE EXTERNAL DIAMETER (D) OF THE TUBE AND OF THE LINER EXPANSION (ΔL)



fg. 2.2

Example

D = 40 mm and $\frac{\Delta L}{2} = 15$ mm

join with a straight line the diameter of the tube D = 40mm with the value $\frac{\Delta L}{2} = 15$ mm

The point of intersection with the line of values x corresponds to the minimum distance of approx. 800 mm

2.2 PRESSURE LOSS IN PIPES

The movement of a liquid mass in a Pipe sets up resistances which act in a contrary direction to the movement of the liquid in the Pipe, termed as direction of flow.

These resistances are of two types

1. CONTINUOUS

The continuous resistances, so called because they develop throughout the length of the Pipe, are caused by friction between the liquid and the wet surface inside the Pipe; and friction caused by reciprocal movements between molecules of different speeds - those in the centre of the tube having maximum speed, while those in contact with the Pipe walls having minimum speed.

2. CASUAL

Casual resistances are due to localized causes at some points along the tube because of changes in direction, or because of sections, valves etc.
All these causes give rise to loss in pressure.
During the study phase of the installation it is necessary, in order to measure the Pipes in relation to capacity and pressure, to know loss of pressure due to Continuous and casual resistances.

For a speedy calculation of loss of pressure consult:

Table 2.4 on page 10 for loss of pressure in Pipes and Fig. 2.3 on page 12 for loss of pressure fittings.

Note:

In addition to the pressure loss in pipes, more usage of fittings cause additional pressure loss in the system. Therefore, Anton has introduced a vast range of fittings for you to select correct fittings and build your plumbing system with least number of fittings, and to minimise additional loss of pressure in the system.

2.3 WATER HAMMER

In a pressure pipe at every sudden variation in the speed of the movement of the liquid within it, a succession of extra pressures are produced, which multiply with great speed along the pipe and cause a series of violent knocks against the walls. This always happens when a valve situated at the end of the pressure pipe is opened or closed. Consequently it is necessary to know the value of this extra-pressure so as to specify the pipe that can resist the maximum pressure produced.

Therefore ANTON pipes are made to withstand very extra high pressures.

Eg.:- The working pressure of 20 mm PN_T14 pipe is 14 bar at 30^{0}C. But in our Laboratory we test this pipe for 68 bars of pressure, and it successfully withstand the same. This special feature is to withstand internal pressures such as water hammer.

The diagram (Table 2.5) given in page 11 can be used to determine the extra pressures that result in the service conditions of the plant (length of pipe L, speed of liquid V, time of closure of the valve T)

This diagram indicates the extra pressure to which the value of static pressure must be added to obtain the maximum pressure, which acts in the pipe.

Static pressure	P = 3 kg/cm^2
Fluid speed	V=2.5m/sec.
Length of pipe	L = 200 m
Time of closure of the valve	T = 2 sec

From V = 2.5 draw a horizontal line until it meets the line L = 200. Drop a vertical line from this point until it meets the line T = 2. A horizontal line from this point will obtain the extra pressure of 13 Kg/cm^2

Total pressure, which acts in the pipe is
P=13+3=16kg/cm^2

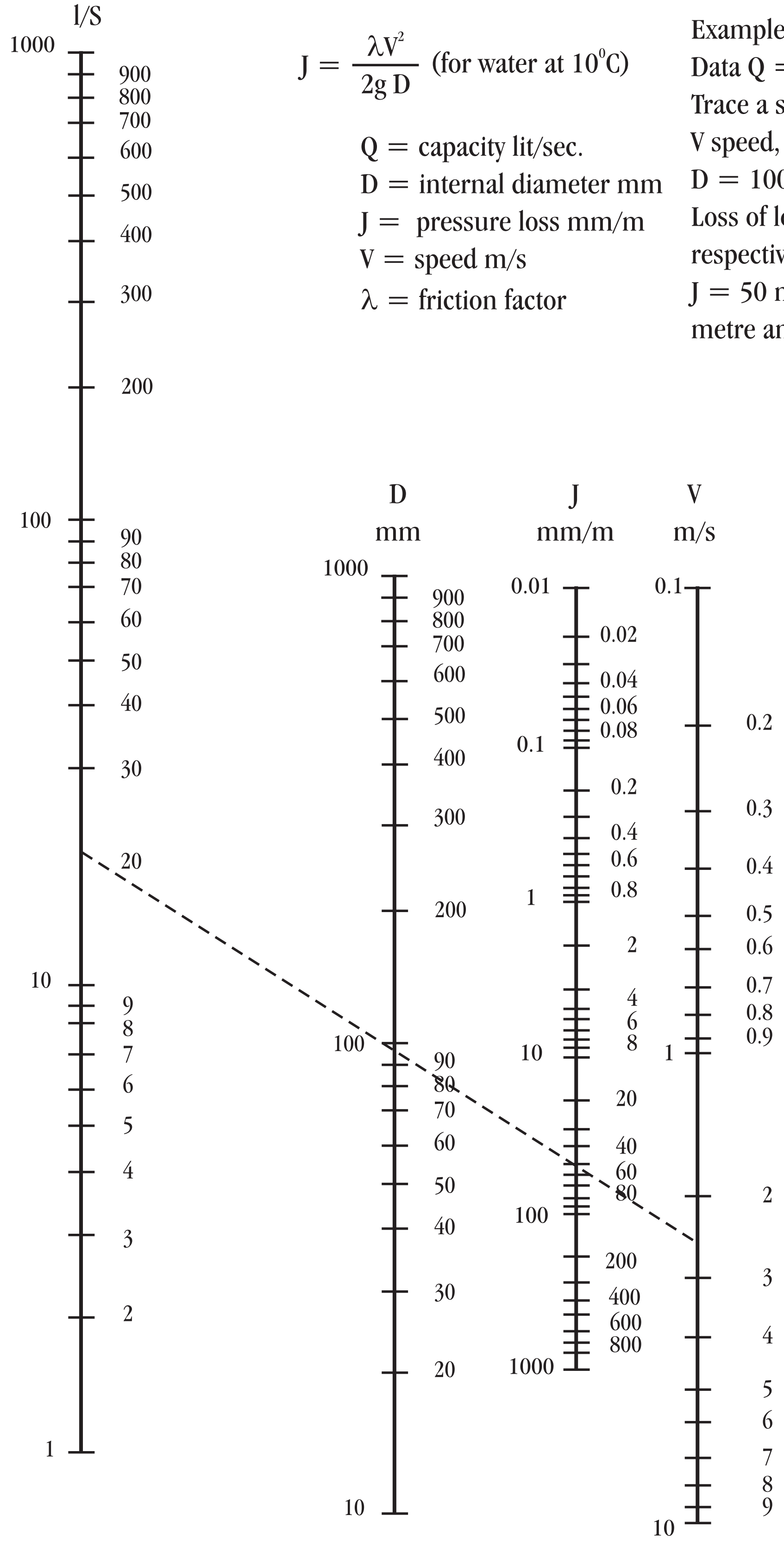
Table 2.4

TABLE OF PRESSURE LOSS IN UNPLASTICIZED PVC PIPES OBTAINED FROM BLASIUS FORMULA

$$J = \frac{\lambda V^2}{2g\,D} \quad \text{(for water at } 10^0\text{C)}$$

Q = capacity lit/sec.
D = internal diameter mm
J = pressure loss mm/m
V = speed m/s
λ = friction factor

Example:
Data Q = 20 litre/sec. and D = 100mm
Trace a straight line between lines Q capacity and V speed, passing through points Q = 20 and D = 100 mm.
Loss of load and speed correspond respectively to
J = 50 mm column of water per metre and V 2.5 m/sec.



LENGTH OF PIPES - m

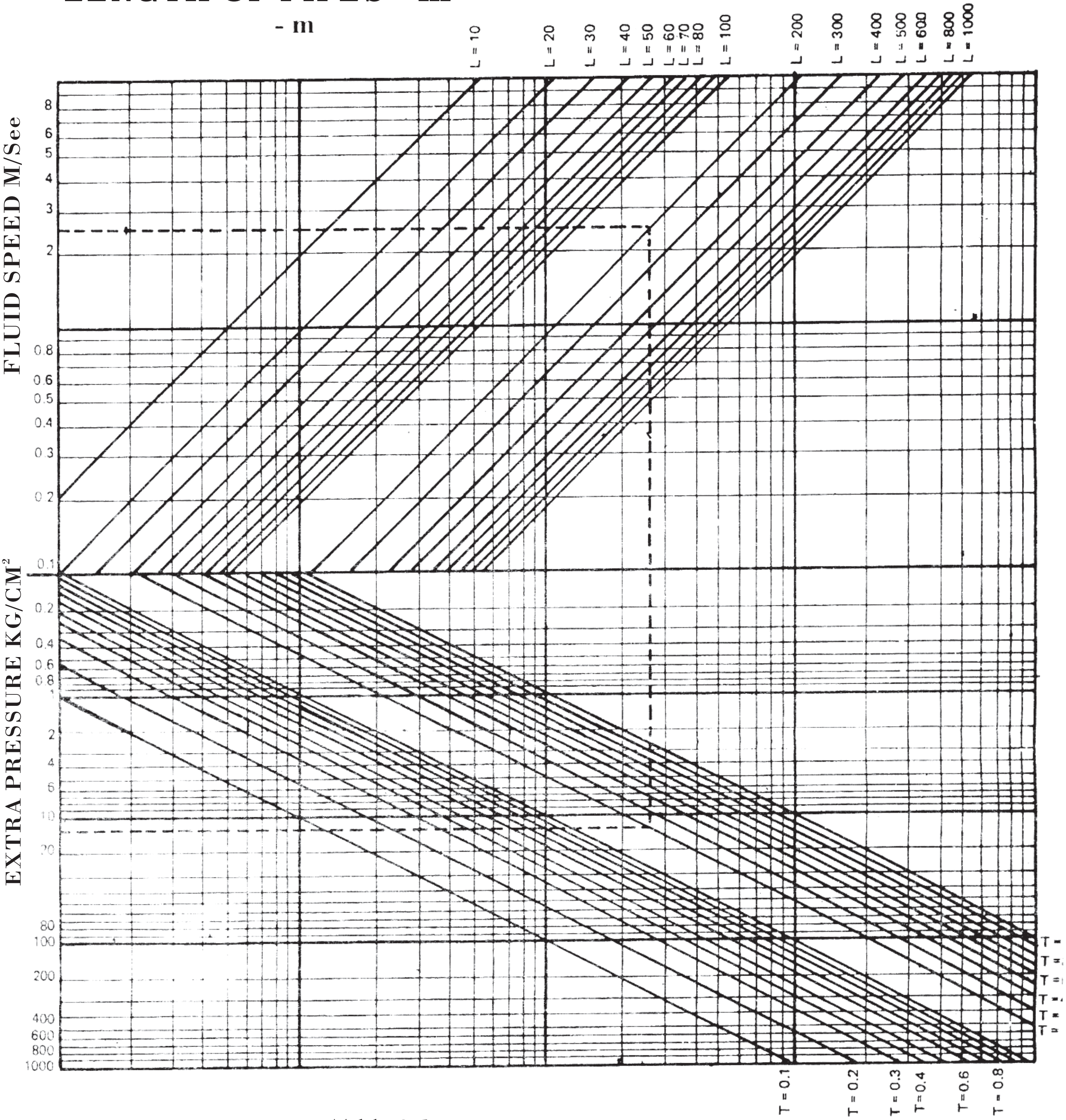


Table 2.5

TIME OF CLOSURE OF THE VALVE - S

2.4 PRESSURE LOSS IN FITINGS

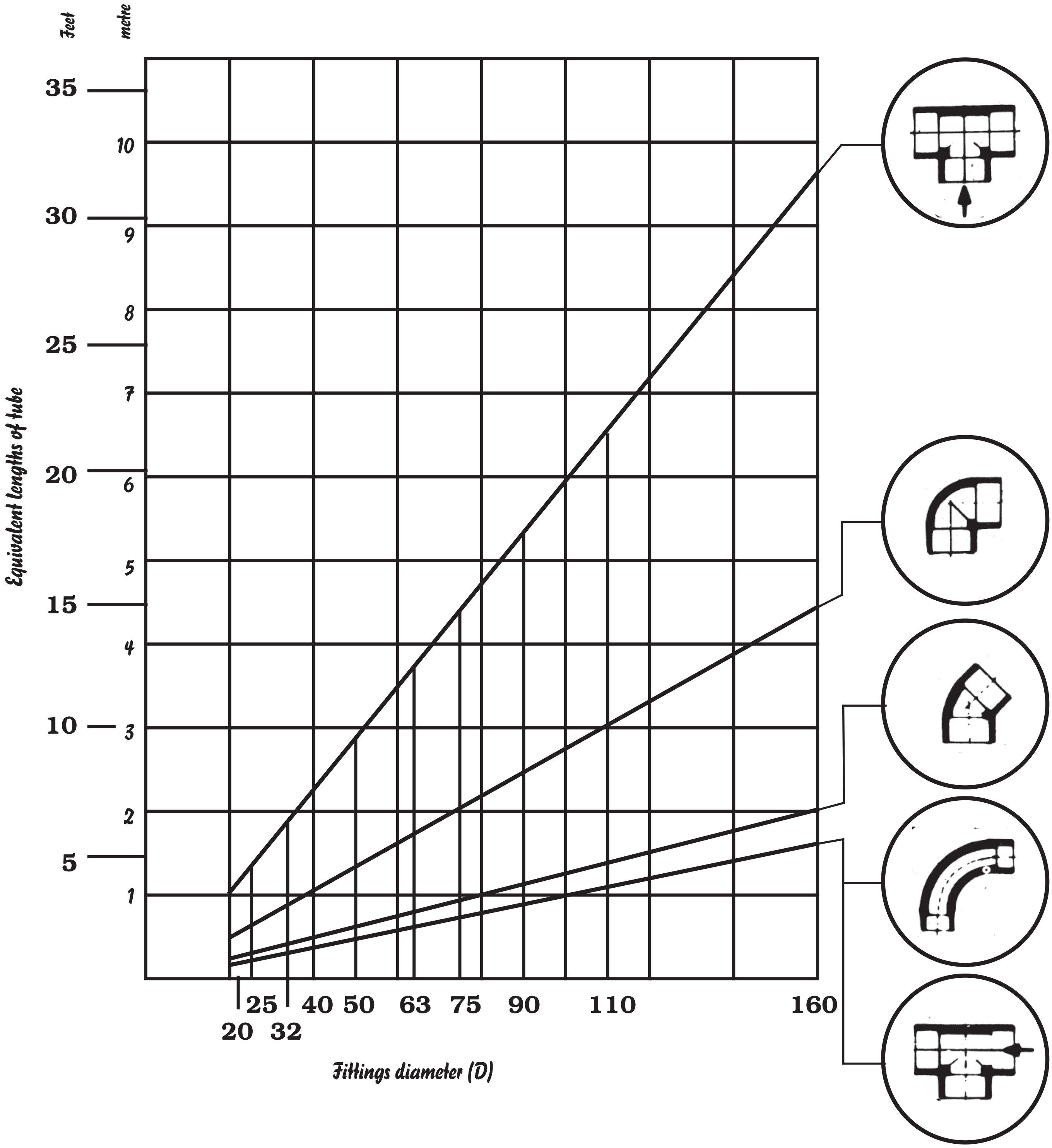


fig. 2.3

3. INJECTION MOLDED FITTINGS

ANTON provides the full range of uPVC fittings to the water pipe system which are manufactured to SLS 659 : 2015 They are injection moulded and carry high technological features to provide leakproof perfect joints in the plumbing field.

3.1 PHYSICAL CHARACTERISTICS OF ANTON uPVC FITTINGS

Table 3.0

CHARACTERISTICS	VALUE	SLS STANDARD	RELATED INTERNATIONAL STANDARD
Effect of Heating		SLS 659 : 2015	ISO 580 : 2005
Hydraulic Internal Pressure		SLS 659 : 2015	ISO 1167:2006
Vicat Softenign Temperature	74^{0} C (min)	SLS 659 : 2015	ISO 2507 : 1995
Effect if materials on water quality	Lead (Pb) 0.01 mg/L (max)	SLS 659 : 2015	ISO 3114 : 1997
Crushing Test		SLS 659 : 2015	BS EN 802:1995

659

All ANTON uPVC Water Pipe Fittings Conform To SLS 659 : 2015

3.2 ANTON INJECTION MOLDED FITTINGS RANGE

EQUAL SOCKET

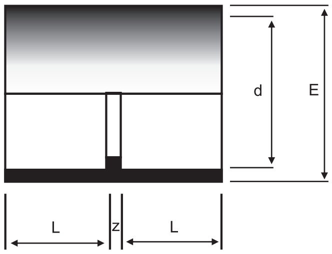


fig. 3.1

Table 3.1

Size	d	E	L	Z
20	20.0	26.0	17.0	3.0
25	25.0	31.0	19.5	3.0
32	32.0	38.0	23.0	3.0
40	40.0	46.0	27.0	3.0
50	50.0	56.8	32.0	3.0
63	63.0	71.6	38.5	3.0

FAUCET SOCKET

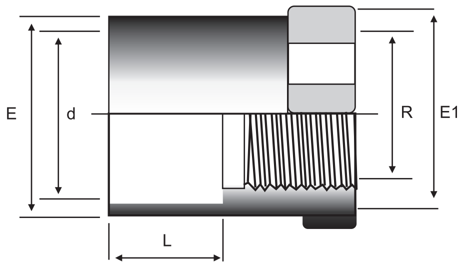


fig. 3.2

Table 3.2

Size	d	E	L	L1	R
20	20.0	26.0	17.0	38.5	½" BSP
25	25.0	31.0	19.5	42.3	3/4" BSP
32	32.0	38.0	23.0	49.8	1" BSP
40	40.0	46.0	27.0	56.3	1 1/4" BSP
50	50.0	56.8	32.0	62.4	1 1/2" BSP
63	63.0	72.1	38.5	72.4	2" BSP
75	75.0	85.6	45.2	84.5	2½" BSP
90	90.0	102.0	53.3	100.0	3" BSP
110	110.0	122.3	62.0	110.0	4" BSP

VALVE SOCKET

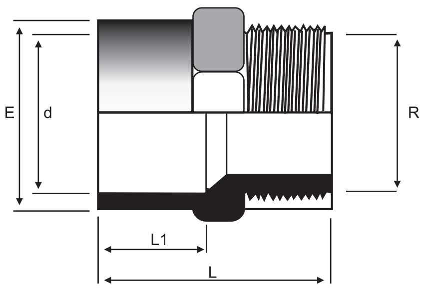


fig. 3.3

Table 3.3

Size	d	E	L	L1	R
20	20.0	26.0	39.4	17.0	½" BSP
25	25.0	31.0	46.7	19.5	3/4" BSP
32	32.0	38.0	51.8	23.0	1" BSP
40	40.0	46.0	59.8	27.0	1 1/4" BSP
50	50.0	56.8	64.5	32.0	1 1/2" BSP
63	63.0	71.6	78.4	38.5	2" BSP
75	75.0	85.3	95.0	46.0	2 1/2" BSP
90	90.0	102.5	115.0	53.0	3" BSP
110	110.0	123.3	128.0	63.0	4" BSP

REDUCING SOCKET

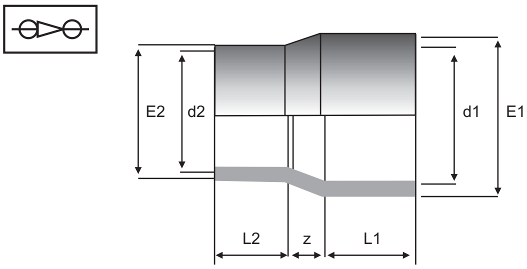


fig. 3.4

Table 3.4

Size	d1	E1	d2	E2	L1	L2	Z
25x20	25.0	31.5	20.0	27.5	20.3	16.6	6.0
32x20	32.0	39.0	20.0	26.5	23.5	17.0	8.0
32x25	32.0	39.0	25.0	32.1	24.7	19.3	8.0
40x20	40.0	46.6	20.0	26.9	28.0	17.1	10.0
40x25	40.0	46.6	25.0	31.9	28.5	20.1	10.0
40x32	40.0	46.6	32.0	39.0	28.5	22.7	10.0
50x20	50.0	57.2	20.0	26.5	32.0	20.0	15.0
50x25	50.0	57.2	25.0	31.6	32.0	19.5	13.0
50x32	50.0	56.2	32.0	38.0	33.0	24.6	13.0
50x40	50.0	56.4	40.0	46.6	33.0	27.0	13.0
63x25	63.0	71.6	25.0	31.0	38.5	19.5	20.0
63x32	63.0	72.0	32.0	38.8	38.0	23.0	17.0
63x40	63.0	73.0	40.0	47.0	39.0	27.0	17.0
63x50	63.0	72.0	50.0	57.0	39.0	33.0	17.0
90x63	90.0	102.5	63.0	72.1	53.2	40.0	23.0
110x63	110.0	124.0	63.0	72.1	62.0	40.0	27.0
110x90	110.0	122.8	90.0	102.0	62.0	52.0	27.0

EQUAL TEE

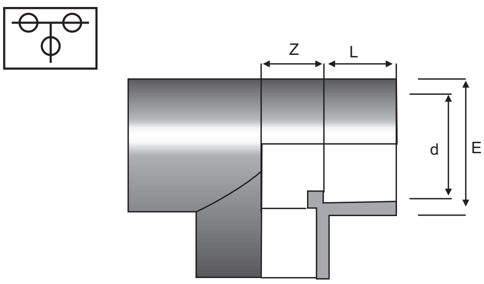


fig. 3.5

Table 3.5

Size	d	E	L	Z
20	20.0	26.2	17.0	11.0
25	25.0	31.8	19.8	13.5
32	32.0	38.2	23.3	17.0
40	40.0	46.0	27.0	21.0
50	50.0	57.0	31.8	26.0
63	63.0	72.0	39.2	32.5
75	75.0	85.1	44.3	38.5
90	90.0	102.3	51.5	46.0
110	110.0	123.2	62.6	56.0
160	160.0	177.3	87.0	81.0

FAUCET TEE

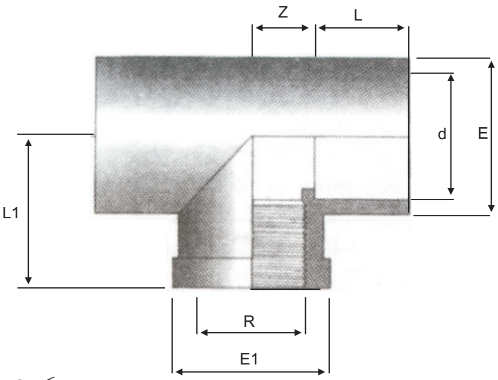


fig. 3.6

Table 3.6

Size	d	E	L	L1	R	E1
20	20.0	27.4	17.0	30.5	1/2"BSP	26.8

As per IS 659 standard 3.0 mm is the minimum wall thickness of injection molded fittings

REDUCING TEE

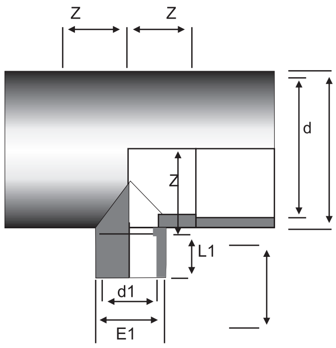


fig. 3.7

Table 3.7

Size	d1	E1	d1	E1	L	L1	Z	Z1
25x20	25.0	31.0	20.0	26.0	19.5	18.0	13.5	13.5
32x20	32.0	38.0	20.0	26.0	23.0	17.0	17.0	17.0
32x25	32.0	38.0	25.0	31.0	23.0	19.5	17.0	17.0
40x20	40.0	46.0	20.0	26.0	27.0	17.0	21.0	21.0
40x25	40.0	46.6	25.0	31.6	27.0	19.5	21.0	21.0
40x32	40.0	46.0	32.0	38.0	27.0	23.0	21.0	21.0
50x25	50.0	56.8	25.0	31.0	32.0	19.5	26.0	26.0
50x32	50.0	56.8	32.0	38.0	32.0	23.0	26.0	26.0
50x40	50.0	56.8	40.0	46.0	32.0	27.0	26.0	26.0
63x32	63.0	71.6	32.0	38.0	38.5	23.0	32.5	32.5
63x40	63.0	71.0	40.0	46.0	38.5	27.0	32.5	32.5
63x50	63.0	71.6	50.0	57.4	39.0	32.0	32.5	32.5
75x40	75.0	85.3	40.0	46.4	44.0	28.0	38.5	38.5
75x50	75.0	85.3	50.0	57.0	44.0	31.5	38.5	38.5
75x63	75.0	85.3	63.0	71.3	44.0	38.0	38.5	38.5
90x50	90.0	102.3	50.0	57.3	51.5	31.5	46.0	46.0
90x63	90.0	102.3	63.0	71.3	51.5	38.5	46.0	46.0
90x75	90.0	102.3	75.0	85.3	51.0	43.5	46.0	46.0
110x50	110.0	122.8	50.0	57.6	62.5	33.5	56.0	56.0
110x63	110.0	122.8	63.0	71.6	61.5	38.0	56.0	56.0
110x75	110.0	122.8	75.0	85.0	61.5	44.0	56.0	56.0
110x90	110.0	122.8	90.0	102.0	62.0	52.0	56.0	56.0
160x110	160.0	177.0	110.0	124.0	87.0	62.0	80.0	80.0

REDUCING FAUCET TEE

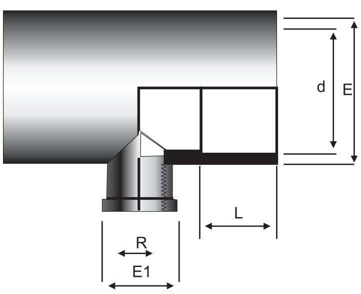


fig. 3.8

Table 3.8

Size	d	E	L	R	E1
25X20	25.0	31.5	20.5	1/2"BSP	29.5
32X20	32.0	38.6	23.5	1/2"BSP	29.5
32X25	32.0	40.4	23.6	3/4"BSP	35.0

ELBOW

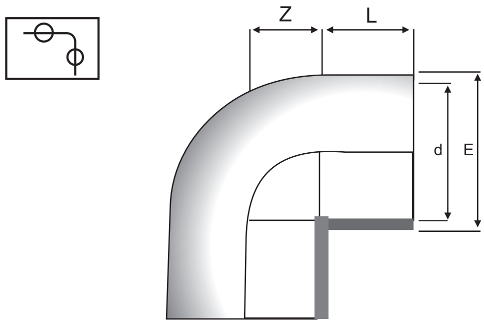


fig. 3.9

Table 3.9

Size	d	E	L	Z
20	20.0	26.2	17.5	11.3
25	25.0	31.0	19.5	13.5
32	32.0	38.2	23.1	17.0
40	40.0	46.2	27.0	21.0
50	50.0	56.6	32.0	26.0
63	63.0	71.8	38.9	32.5
75	75.0	84.4	46.5	38.5
90	90.0	102.0	53.0	46.0
110	110.0	122.0	62.0	56.0

FAUCET ELBOW

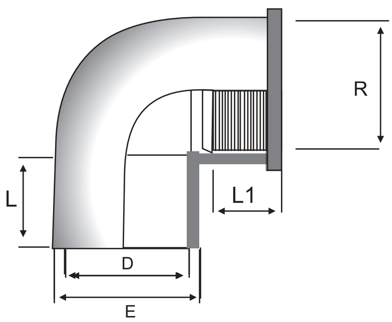


fig. 3.10

Table 3.10

Size	d	E	L	L1	R
20	20.0	26.8	17.0	14.0	1/2"BSP

REDUCING ELBOW

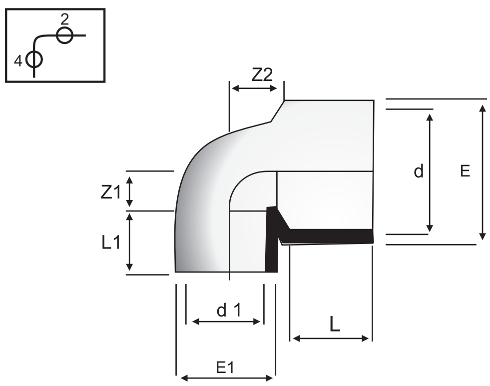


fig. 3.11

Table 3.11

Size	d	E	d1	E1	L	L1	Z1	Z2
25x20	25.0	31.8	20.0	27.0	21.8	18.0	11.0	16.8
32x20	32.0	40.4	20.0	26.5	24.0	18.0	11.0	23.0
32x25	32.0	40.4	25.0	31.6	23.7	20.0	14.0	21.0

END CAP

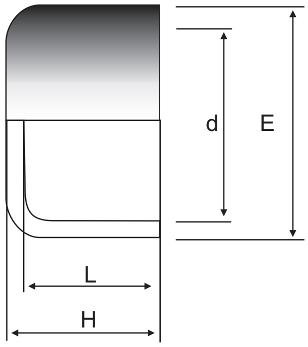


fig. 3.12

Table 3.12

Size	d	E	L	H
20	20.0	26.6	16.2	24.0
25	25.0	31.4	20.0	27.0
32	32.0	40.4	22.2	29.2
40	40.0	46.0	27.0	35.6
50	50.0	57.0	32.0	43.9
63	63.0	69.2	38.0	49.6
75	75.0	88.0	46.0	59.0
90	90.0	102.5	53.0	71.0
110	110.0	123.3	63.0	87.0
160	160.0	183..0	88.0	128.0

BEND

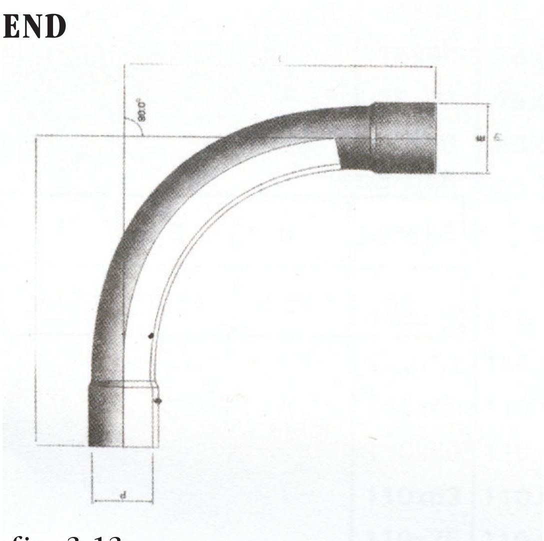


fig. 3.13

Table 3.13

Size	d	E	L
20	20.0	23.0	100
25	25.0	28.5	105
32	32.0	36.3	120
40	40.0	44.5	150
50	50.0	56.8	180
63	63.0	72.0	230
90	90.0	102.0	404
110	110.0	124.0	445
160	160.0	180.0	650
225	225.0	252.0	870

Note : All " ANTON" threaded pipe fittings conform to SLS 659 : 2015 standard.

3.3 INJECTION MOLDED FITTINGS WITH BRASS THREAD INSERT

20mm WINGBACK FAUCET ELBOW | **20mm WINGBACK FAUCET TEE** | **20mm FAUCET SOCKET**

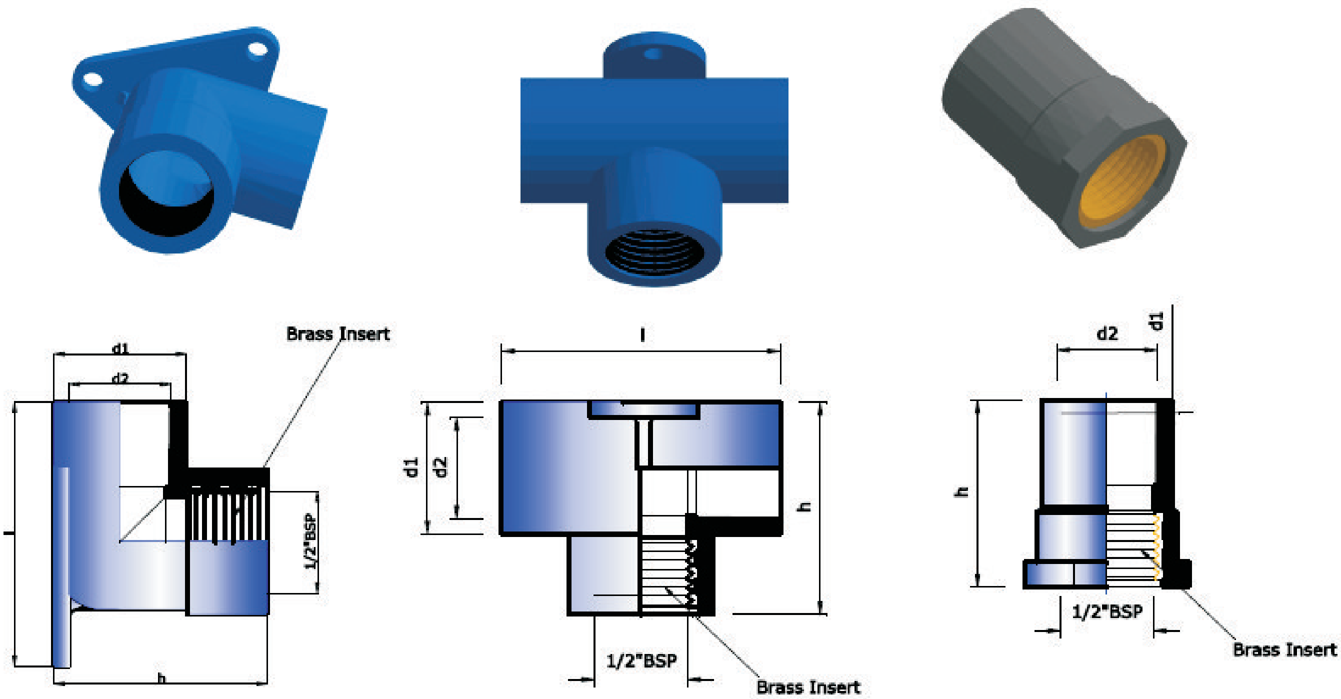


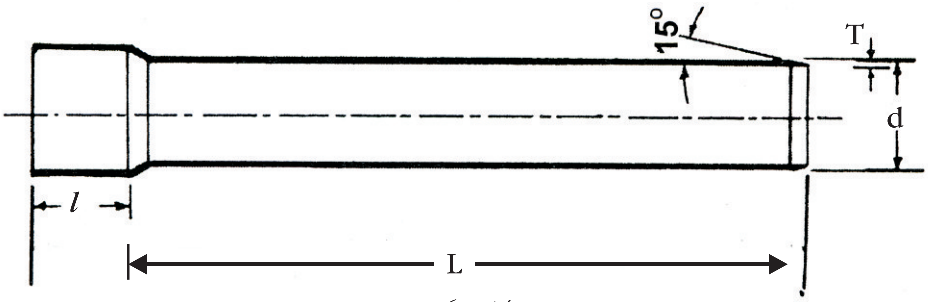
fig. 3.14

PRODUCT / SIZE	20mm WINGBACK FAUCET ELBOW	20mm WINGBACK FAUCET TEE	20mm FAUCET SOCKET
d1	26.5	26.5	26.5
d2	20.5	21	20
h	43	43	37.5
1	53	56	-
Pressure Type	PN 16	PN 16	PN 16

Table 3.14

4. LARGE SIZE PIPES & FITTINGS

4.1 PRESSURE PIPE WITH SOLVENT SOCKETS



L = 6m/4m

Table 4.1

fig 4.1

d	PNT7			PNT9			PNT11		
	T	l	Kg/m	T	l	Kg/m	T	l	Kg/m
63	2.5-3.0	70	0.795	3.0-3.5	74	0.856	3.8-4.4	74	1.090
75	2.9-3.4	76	0.998	3.6-4.2	76	1.222	4.5-5.2	76	1.450
90	3.5-4.1	95	1.443	4.3-5.0	95	1.750	5.4-6.2	95	2.152
110	3.5-4.1	105	1.733	4.2-4.9	105	2.115	5.3-6.1	105	2.620
140	4.3-5.0	135	2.774	5.4-6.2	135	3.430	6.7-7.6	135	4.186
160	4.9-5.6	140	3.579	6.2-7.1	140	4.493	7.7-8.7	140	5.485
225	6.9-7.8	190	7.048	8.6-9.7	190	8.700	10.8-12.1	190	10.773
280	8.6-9.7	230	10.919	-	-	-	13.4-15.0	230	16.630
315	9.7-10.9	270	13.827	-	-	-	15.0-16.7	270	20.891

4.2 SOLVENT SOCKETED FITTINGS

EQUAL SOCKET

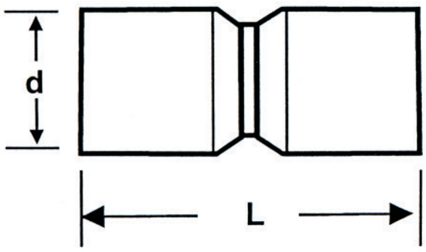


fig. 4.2

Table 4.2

d mm	75	90	110	140	160	225	280	315
L mm	160	200	240	280	350	470	610	650

REDUCING SOCKET

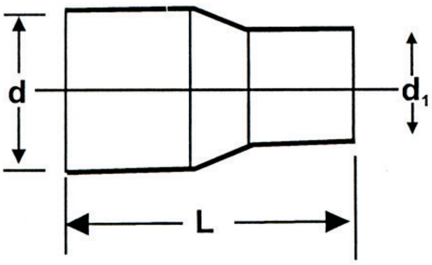


fig. 4.3

Table 4.3

d/d 1	L
75/63	174
140/110	290
160/110	478
160/140	307
225/160	455
280/225	523
315/280	549

SOLVENT SOCKETED REPAIR SOCKET

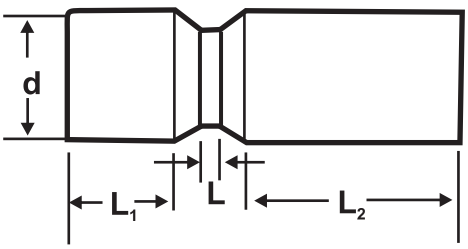


fig. 4.4

Table 4.4

d	L1	L2	L
63	74	150	10
75	76	140	10
90	95	203	10
110	105	241	30
140	135	300	30
160	140	310	30
225	190	460	50
280	230	600	50
315	270	630	50

END CAP

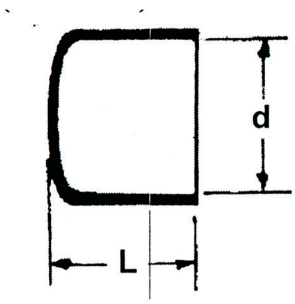
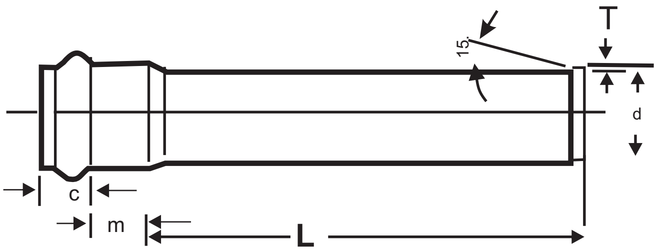


fig. 4.5

Table 4.5

d	L
140	120
225	185
280	225
315	250

4.3 PRESSURE PIPE WITH BELL SOCKET



L = 6m/4m

fig. 4.6

S = Depend on the type of pipe
L = 4m from 63 mm - 75mm
6m from 90 mm - 315 mm

Table 4.6

d	63	90	110	160	225	280	315
m	68	65	85	96	86	124	110
c	40	45	50	55	65	75	80

BELL SOCKETED EQUAL SOCKET

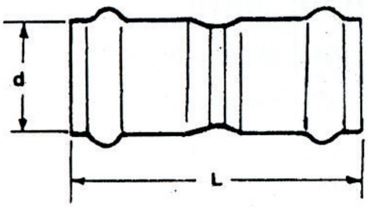


fig. 4.7

Table 4.7

d	63	90	110	160	225	280	315
L (min)	234	266	285	341	404	460	499

BELL ENDED REP AIR SOCKET

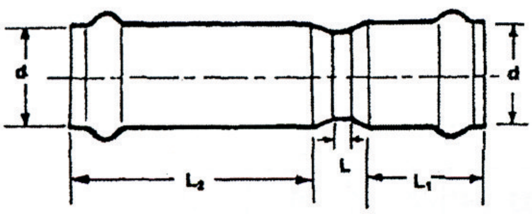


fig. 4.8

Table 4.8

d	L1	L2	L
90	130	285	20
110	160	330	20
160	184	390	100
225	216	440	140
280	280	540	110
315	280	650	200

SOLVENT & BELL ENDED REPAIR SOCKET

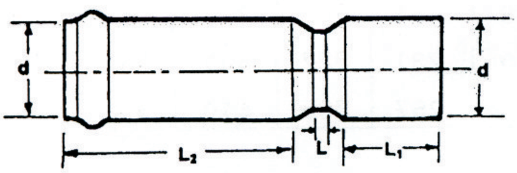


fig. 4.9

Table 4.9

d	L1	L2	L
63	75	250	10
90	100	270	10
110	120	290	30
160	150	380	30
225	210	500	50
280	280	540	50
315	300	580	50

4.4 BENDS AS PER DIN STANDARD

SINGLE SOLVENT SOCKET BENDS
11°-90° BEND

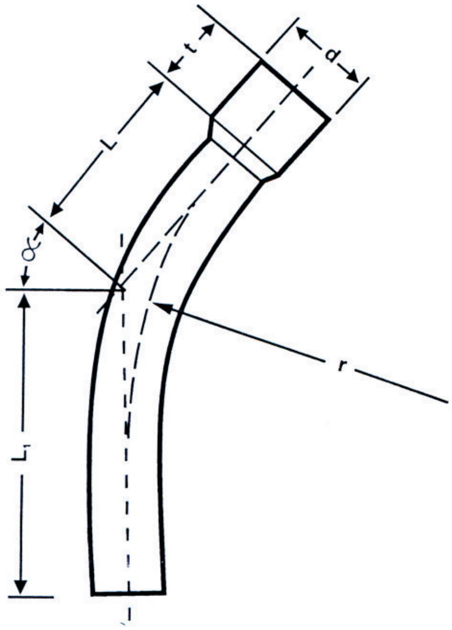


fig. 4.10

Table 4.10

d	t Socket length	L/L1						
		r \ α	11 1/4°	22 1/2°	30°	45°	60°	90°
63	63	221	110/180	120/190	120/190	115/185	130/185	140/185
75	85	263	210/345	220/355	220/355	240/375	330/465	420/555
90	100	315	210/345	220/370	220/370	140/390	330/480	420/570
110	120	385	250/420	290/460	290/460	280/450	350/520	420/590
140	140	490	200/390	270/450	270/450	520/710	585/775	650/840
160	150	560	200/400	270/470	270/470	520/720	585/785	650/850
225	210	788	340/600	420/680	420/680	620/880	732/992	845/1105
280	280	980	450/780	520/800	520/800	870/1150	870/1150	1300/1580
315	300	1103	590/890	600/900	600/900	1010/1310	1010/1310	1485/1835

DOUBLE SOLVENT SOCKET BENDS
11°-90° BEND

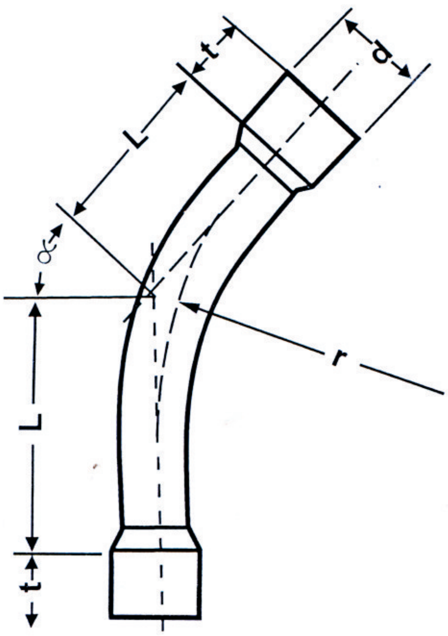


Table 4.11

d	t Socket length	L/L1						
		r \ α	11 1/4°	22 1/2°	30°	45°	60°	90°
63	63	221	110	120	120	115	130	140
75	85	263					330	420
90	100	315	210	220	220	240	330	420
110	120	385	250	290	290	280	350	420
140	140	490	200	270	270	520	585	650
160	150	560	200	270	270	520	585	650
225	210	788	340	420	420	620	732	845
280	280	980	450	520	520	870	870	1300
315	300	1103	590	600	600	1010	1010	1485

fig. 4.11

SINGLE BELL SOCKET BENDS

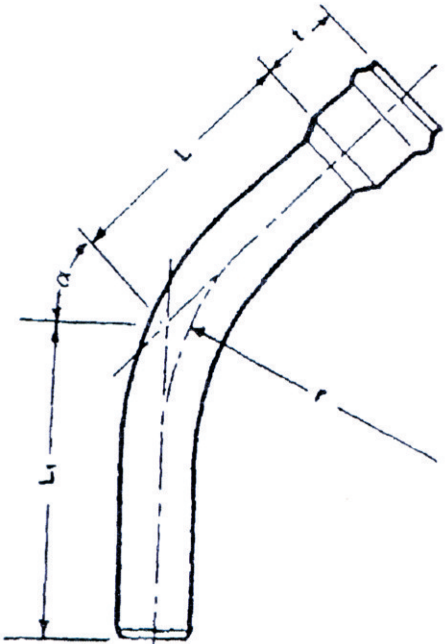


fig. 4.12

Table 4.12

d	t Socket length	L/L1						
		r \ α	11 1/4°	22 1/2°	30°	45°	60°	90°
63	120	221	110/340	110/250	120/250	120/145	140/145	140/145
90	130	315	210/390	220/400	220/400	240/420	330/510	420/600
110	160	385	250/450	290/500	290/500	280/490	350/560	420/630
160	184	560	200/434	270/404	270/404	520/754	585/819	650/884
225	216	788	340/606	420/686	420/686	620/886	732/998	845/1111
280	280	980	450/780	520/800	520/800	870/1150	870/1150	1300/1580
315	280	1103	590/870	600/880	600/880	1010/1290	1010/1290	1485/1815

DOUBLE BELL SOCKET BENDS 11°-90°

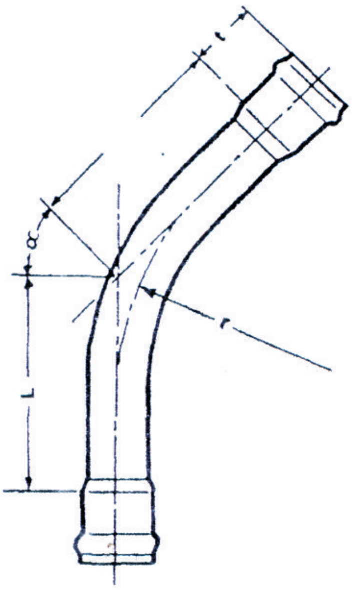


Table 4.13

d	t Socket length	L/L1						
		r \ α	11 1/4°	22 1/2°	30°	45°	60°	90°
63	120	221	110	110	120	120		140
90	130	315	210	220	220	240	330	420
110	160	385	250	290	290	280	350	420
160	184	560	200	270	270	520	585	650
225	216	788	340	420	420	620	732	845
280	280	980	450	520	520	870	870	1300
315	280	1103	590	600	600	1010	1010	1485

fig. 4.13

BELL ENDED TEE SOCKET

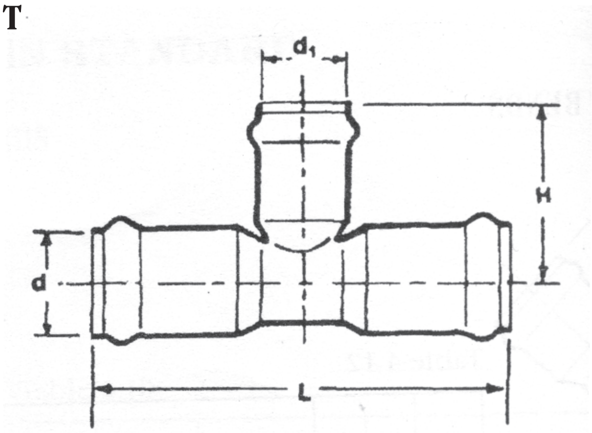


fig. 4.14

Table 4.14

d/d1	L	H	d/d1	L	H
63/63	267	134	160/160	473	237
90/63	304	146	225/90	474	225
90/90	328	164	225/110	492	240
110/63	333	155	225/160	538	266
110/90	357	173	225/225	596	298
110/110	375	188	280/225	742	298
160/63	385	178	280/280	742	371
160/90	409	196	315/225	835	298
160/110	427	211	315/280	835	371
160/140	455	223	315/315	835	417

BELL ENDED SLEEVE JOINT

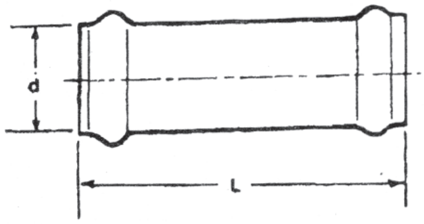
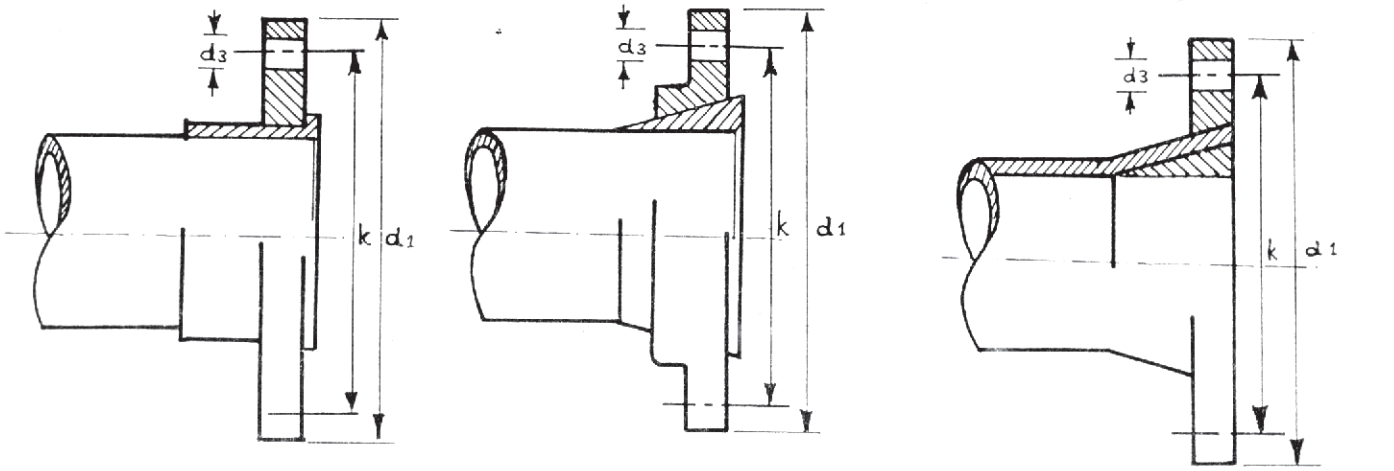


fig. 4.15

Table 4.15

d (mm)	90	110	160	225	280	315
L (mm)	300	320	370	440	510	560

4.5 FLANGE CONNECTIONS



Flanges with collared bush

Flanges with tapered bush

Flanges with tapered core

fig. 4.16

Table 4.16

Outside Diameter	d1	k	d3	Bolt Holes	
				Number	Thread Size
63	165	125	18	4	M16
75	185	145	18	4	M16
90	200	160	18	8	M16
110	220	180	18	8	M16
140	250	210	18	8	M16
160	285	240	22	8	M20
225	340	295	22	8	M20
280	405	355	26	12	M24
315	460	410	26	12	M24