



ROYAL PVC Co.LTD

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SECTION 01

Royal PVC Pressure Pipe







ROYAL PVC PRESSURE PIPE

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Standard & Range of Royal Pressure PVC Pipe

Royal PVC Pipes are manufactured in the following standard and range.

STANDARDS:

For Pressure Pipes:

RANGE:

- BSS 3505- 1986 B, C, D & E Classes
- ASTM-D 1785-1894 Sch- 40 Sch- 80 and Sch- 120
- ASTM D 2241 (SDR Series)
- PSI 3051, 1991

Nominal Diameter:

- From 3/4" to 18"

Royal PVC Pressure and Non Pressure pipes are supplied in plain, and socket ends with or without provision or rubber rings.

APPLICATIONS

- Royal PVC Pipe for water supply lines to provide safe drinking water to the area.
- Royal PVC used as Strainer and casing for Tube well boring.
- Royal PVC Pipe is best for transportation of acid, chemical, chlorine & other liquid chemical etc.
- Royal PVC are registered to corrosion therefore, it is used in lower fraction rate in the most suitable crude oil line.
- Royal PVC Pipe can be used for transport of alum and pulp in the sugar industries.
- City water supply piping.
- Sea water aquiculture.
- Water treatment piping for water treatment plant

Advantages of Royal PVC Pressure Pipes

PVC pipe have a number of technical advantage over other systems:

1. IT IS NOT CORRODED

PVC Pipe do not corrode and are totally unaffected by Acids, Alkalies and electrolytic corrosion from any source. In this respect they out class any other pipes material including stainless steel. Infact PVC is virtually unaffected by water.

2.IT IS LIGHT IN WEIGHT EASY AND QUICK TO INSTALL

Pipe made from PVC are only about 1/5 the weight of an equivalent cast iron pipe and from 1/3 to 1/4 the weight for an equivalent cement pipe. Thus, the cost of transportation and installation is cut down enormously.

3.IT HAS AN EXCELLENT HYDRAULIC CHARACTERISTIC

PVC Pipe have extremely smooth bore due to which frictional losses are at minimum and flow rates are at the highest possible from any other pipe materials.

4. IT IS NON FLAMMABLE

PVC Pipe is self extinguishing and it does not support combustion.

5. IT IS FLEXIBLE AND RESISTANCE TO BREAKAGE

The flexible nature of PVC Pipe means that unlike asbestos, cement or cast iron pipes. They are not liable to beam failure and can thus more readily accommodate the pipe is connected.

6. IT IS RESISTANCE TO BIOLOGICAL GROWTH

Due to smoothness of inner surface of PVC Pipe, it prevents Algae, bacteria and fungi formation inside the pipe.

7. LONG LIFE

The established aging factor of the commonly used pipe is not applicable on PVC Pipe. A 100 years' safe life estimated for PVC Pipe.

**TABLE of PIPE DIMENSIONS FOR
CLASSES B, C, D AND E**

Nominal Size	Mean outside Diameter		Class B 6 bar (200 ft. head) 60.96m				Class C 9 bar (300 ft. head) 91.44m				Class D 12 bar (400 ft. head)121.92m				Class E 15 bar (500 ft. head) 152.4m			
			average value		Individual value		average value		Individual value		average value		Individual value		average value		Individual value	
	inch	min.	max.	max.	min.	max.	max.	min.	max.	max.	min.	max	max	min.	max.			
-	Mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm			
3/4"	26.6	26.9	-	-	-	-	-	-	-	-	-	-	2.5	1.9	2.5			
1"	33.4	33.7	-	-	-	-	-	-	-	-	-	-	2.7	2.2	2.7			
1 1/4"	42.1	42.4	-	-	-	-	-	-	2.7	2.2	2.7	3.2	2.7	3.2				
1 1/2"	48.1	48.4	-	-	-	-	-	-	3.0	2.5	3.0	3.7	3.1	3.7				
2"	60.2	60.5	-	-	-	3.0	2.5	3.0	3.7	3.1	3.7	4.5	3.9	4.5				
3"	88.7	89.1	3.4	2.9	3.4	4.1	3.5	4.1	5.3	4.6	5.3	6.5	5.7	6.6				
4"	114.1	114.5	4.0	3.4	4.0	5.2	4.5	5.2	6.8	6.0	6.9	8.3	7.3	8.4				
5"	140.0	140.4	4.4	3.8	4.4	6.3	5.5	6.4	8.3	7.3	8.4	10.1	9.0	10.4				
6"	168.0	168.5	5.2	4.5	5.2	7.5	6.6	7.6	9.9	8.8	10.2	12.1	10.8	12.5				
8"	218.8	219.4	6.1	5.3	6.1	8.8	7.8	9.0	11.6	10.3	11.9	14.1	12.6	14.5				
10"	272.6	273.4	7.5	6.6	7.6	10.9	9.7	11.2	14.3	12.8	14.8	17.5	15.7	18.1				
12"	323.4	324.3	8.8	7.8	9.0	12.9	11.5	13.3	17.0	15.2	17.5	20.8	18.7	21.6				
14"	355.0	356.0	9.6	8.5	9.8	14.1	12.6	14.5	18.6	16.7	19.2	22.8	20.5	23.6				
16"	405.9	407.0	10.9	9.7	11.2	16.2	14.5	16.7	21.1	19.0	21.9	26.0	23.4	27.0				
18"	456.7	457.7	12.3	11.0	12.7	18.2	16.3	18.8	23.8	21.4	24.6	-	-	-				
20"	507.5	508.5	-	12.2	14.1	-	18.1	20.9	-	-	-	-	-	-				
24"	609.1	610.1	-	14.6	16.8	-	21.7	25.0	-	-	-	-	-	-				

Royal Pipe lengths: 4m 5m and 6m

Royal Pipes are normally socket at one end (to suite either Rubber Ring or Solvent Cement joints) and with both ends plain also available.

Royal Pipes of nominal diameter above in various classes can be manufactured against specific orders.

**TABLE of
MAXIMUM SUSTAINED WORKING & FIELD TEST
PRESSURES AS PER BSS 3505**

WORKING PRESSUR

Class	Bar	Kgf/ Cm2	lbf/in2
B	6	6.12	87
C	9	9.18	130
D	12	12.25	173
E	15	15.3	217

The maximum admissible service pressures are calculated from known data on the basis of a life of at least 50 years of continuous operation and a safety factor greater than 2

TEST PRESSURE

TABLE of

Short – term hydrostatic pressure resistance at 20° C Maximum 1 hour failure pressure AS PER BSS 3505

Bar	Kgf/ Cm2	lbf/in2
87	9.18	130
130	13.77	195
173	18.38	259
217	22.95	325

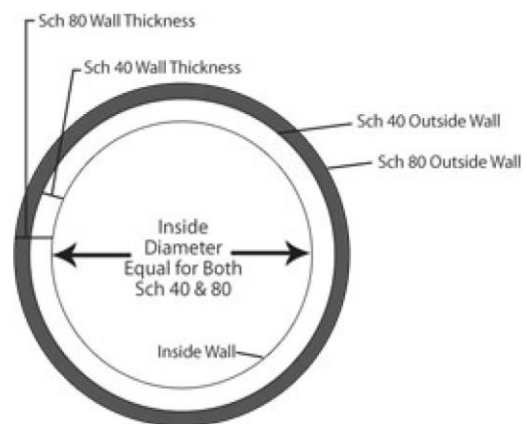
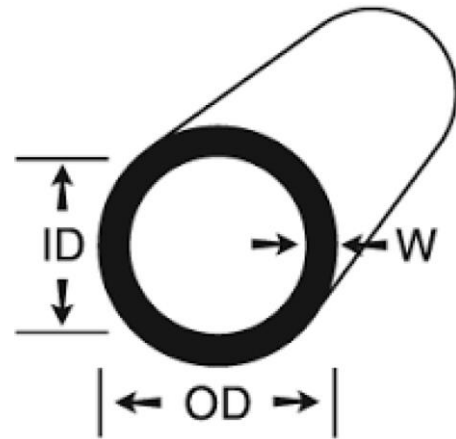
		failure pressure
6 bar	Class - B	21.6 bar
9 bar	Class - C	32.4 bar
12 bar	Class - D	43.2 bar
15 bar	Class - E	54.0 bar

Schedule 40 vs Schedule 80 PVC Wall Thickness

There are two common types of PVC pipe – schedule 40 PVC and schedule 80 PVC. Schedule 40 PVC is usually white in color and schedule 80 is usually a dark gray (they can also be found in other colors). Their most important difference, though, is in their design. Schedule 80 pipe is designed with a thicker wall. This means the pipe is thicker and stronger, and as a result it can handle higher pressures.

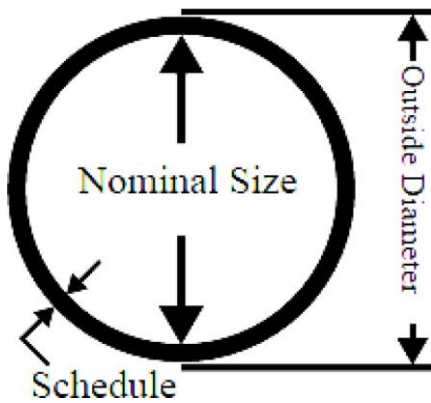
You are probably most familiar with schedule 40 PVC pipe. It's the white pipe you see used for drainage around buildings,. This pipe is best suited for drainage, irrigation, and other cold water systems. Schedule 40 PVC pipe is strong, rigid, and can handle pressure applications. For jobs that require a higher pressurization though, schedule 80 pipe is better suited. Most PVC pipe and fittings have a maximum pressure rating listed so you know what it can handle. Typically, this is listed in pounds per square inch or PSI.

The amount of pressure a pipe is rated for varies based on size, but a 4" schedule 80 PVC pipe for instance is rated at 320 PSI while a schedule 40 PVC pipe of the same size is only rated at 220 PSI. You can find schedule 80 pipe used most often in heavy duty commercial and industrial applications.



Inside Diameter of Schedule 40 vs Schedule 80

If the pipe were the same color, it would be difficult to tell the difference from the outside. In fact, both schedule 40 and schedule 80 PVC pipe have the same outside diameters. So a 1" size sch 40 PVC pipe has the same O.D. as a 1" sch 80 PVC pipe.



The difference is in the inside diameter or I.D. of the pipe. Schedule 80 PVC pipe will have a smaller inside area than Schedule 40 pipe because of its thicker wall.

For that reason, flow is more restricted in Schedule 80 pipe vs Schedule 40 of the same size. The same is true of PVC fittings in both schedules.

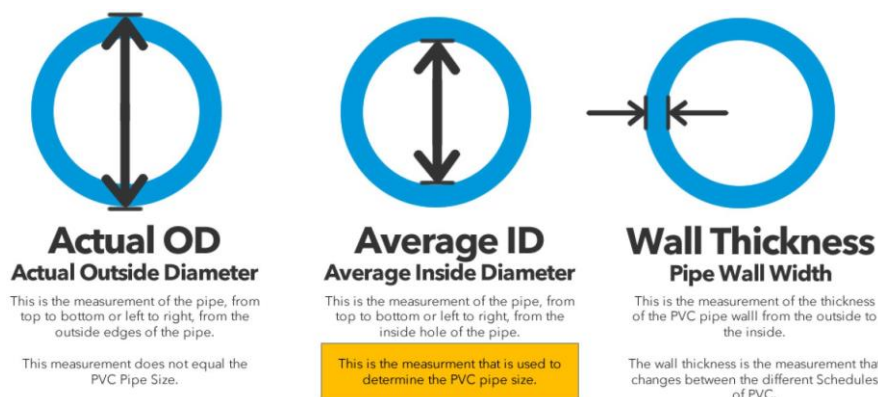
Weight & Price

Two other factors that may play into which schedule PVC you choose are weight and price. Since schedule 80 PVC has a thicker wall, it is heavier than comparable schedule 40 pipe and fittings. That generally makes it more pricey to ship and more difficult to handle when installing large size pipe and fittings. Schedule 80 PVC is also more expensive than schedule 40 because it requires more PVC material and has to withstand higher pressures.



Which to Use – PVC Schedule 40 or PVC Schedule 80?

Don't forget your fittings come in both schedules also! That means all the tees, elbows and couplings come in both schedule 40 and schedule 80 options. Though schedule 40 and 80 fittings will fit on pipe of either schedule, we recommend you use schedule 40 fittings with schedule 40 pipe and vice versa. A pipeline is only as strong as its weakest link - the part or pipe with the lowest.



Nominal Size	Mean Outside Diameter (mm)		Tolerances (mm)		Wall Thickness (mm)					
			For Max & Min (out of The roundness)		Sch. 40		Sch. 80		Sch. 120	
inch	Min Mm	Max mm	sch. 40 sizes 4" and over Sch. 80 sizes 8" and over	sch. 40 sizes 3" and over Sch. 80 sizes 6" and over	Min mm	Tolerance Mm	Min Mm	Tolerance Mm	Min Mm	Tolerance Mm
½	21.24	21.44	----	+ 0.2	2.77	+ 0.51	3.73	+ 0.51	4.32	+ 0.51
¾	26.57	26.77	----	+ 0.25	2.87	+ 0.51	3.91	+ 0.51	4.32	+ 0.51
1	33.27	33.53	----	+ 0.25	3.38	+ 0.51	4.55	+ 0.53	5.08	+ 0.61
1 ½	48.11	48.41	----	+ 0.3	3.68	+ 0.51	5.08	+ 0.61	5.72	+ 0.68
2	60.17	60.47	----	+ 0.3	3.91	+ 0.51	5.54	+ 0.66	6.35	+ 0.76
3	88.70	89.1	----	+ 0.38	5.49	+ 0.66	7.62	+ 0.91	8.89	+ 1.07
4	114.07	114.53	+ 1.27	+ 0.38	6.02	+ 0.71	8.56	+ 1.02	11.10	+ 1.32
6	168.0	168.56	+ 1.27	+ 0.89	7.11	+ 0.86	10.97	+ 1.32	14.27	+ 1.70
8	218.7	219.46	+ 1.9	+ 1.14	8.18	+ 0.99	12.70	+ 1.52	18.24	+ 2.18
10	272.67	273.43	+ 1.9	+ 1.27	9.27	+ 1.12	15.06	+ 1.8	21.41	+ 2.56
12	323.47	324.23	+ 1.9	+ 1.52	10.31	+ 1.24	17.45	+ 2.08	25.40	+ 3.05
14	355.60				11.10	+ 1.35	19.05	+ 2.29		
16	406.40				12.70	+ 1.52	21.41	+ 2.57		

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Maximum Sustained and Burst Pressure Test Conditions for Water at 23 for PVC Pipe

Burst pressure

Pressure Required for Test Psi		
Schedule 40	Schedule 80	Schedule 120
1910	2720	3250
1540	2200	2470
1440	2120	2300
1060	1510	1720
890	1290	1510
840	1200	1420
710	1040	1380
560	890	1190
500	790	1160
450	750	1170
420	730	1090

Sustained pressure

Nominal Pipe Size	Pressure Required for Test Psi		
	Schedule 40	Schedule 80	Schedule 120
1/2			
3/4	1010	1440	1620
1	950	1320	1510
1 1/2	690	990	1130
2	580	850	990
3	590	790	930
4	470	680	900
6	370	590	780
8	330	520	760
10	300	490	770

ASTM D 2241 (SDR Series)

OUTSIDE DIAMETERS, WALL THICKNESSES AND TOLERANCES

Nominal Dia Inches	Nominal Dia mm			SDR 64	SDR 41	SDR 32.5	SDR 26	SDR 21	SDR 17	SDR 13.5
	Average value	Min Value	Max Value 21.44	Wall Thickness	Wall Thickness	Wall Thickness	Wall Thickness	Wall Thickness	Wall Thickness	Wall Thickness
				Min	Min	Min	Min	Min	Min	Min
1/2"	21.34	21.24	26.77	-	-	-	-	-	-	1.57
3/4"	26.67	26.57	33.53	-	-	-	-	1.52	1.57	1.98
1"	33.40	33.27	42.29	-	-	-	1.52	1.60	1.96	2.46
1 1/4"	42.16	42.03	48.41	-	-	1.52	1.63	2.01	2.49	3.12
1 1/2"	48.26	48.11	60.47	-	-	1.52	1.85	2.29	2.84	3.58
2"	60.32	60.17	89.10	-	-	1.85	2.31	2.87	3.56	4.47
3"	88.90	88.70	114.53	-	2.16	2.74	3.43	4.24	5.23	6.58
4"	114.30	114.07	168.56	1.78	2.79	3.51	4.39	5.44	6.73	8.46
6"	168.28	168.00	219.46	2.64	4.11	5.18	6.48	8.03	9.91	12.47
8"	219.08	218.70		3.43	5.33	6.73	8.43	10.41	12.9	-

ASTM D 2241 (SDR Series) Burst Pressure Requirements for Water at 73F (23C)

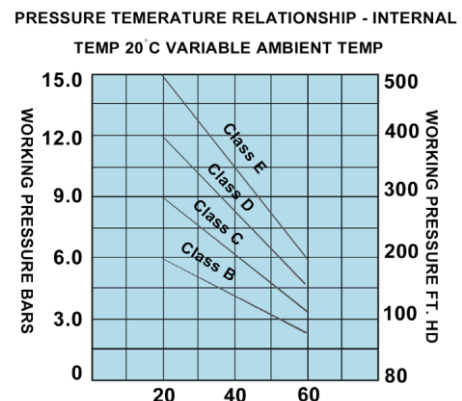
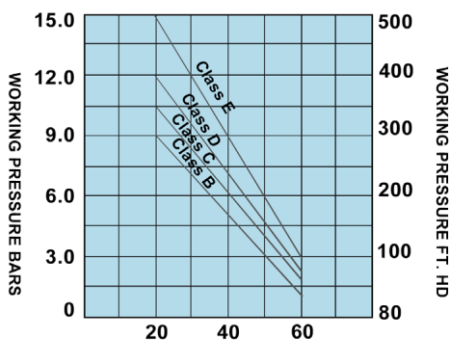
Minimum Burst Pressure				
SDR	PVC 1120 PVC 1220 PVC 2120		PVC 2116 PVC 2112 PVC 2110	
	Psi	Mpa (bar)	Psi	Mpa (bar)
13.5	1000	6.89 (68.9)	800	5.52 (55.2)
17	800	5.52 (55.2)	630	4.34 (43.4)
21	630	4.34 (43.4)	500	3.45 (34.5)
26	500	3.45 (34.5)	400	2.76 (27.6)
32.5	400	2.76 (27.6)	315	2.17 (21.7)
41	315	2.17 (21.7)	250	1.72 (17.2)
64	200	1.38 (13.8)	160	1.10 (11.0)

The fiber stresses used to derive test pressures are as follows		
	Psi	Mpa (bar)
PVC 1120,PVC 1220,PVC 2120	6400	44.1 (441)
PVC 2116,PVC 2112,PVC 2110	5000	34.5 (345)

Pressure/ Temperature Relationship

The pressure/temperature relationship of PVC plays an important part in the behavior of the pipe at elevated temperatures. In case where PVC Pipes are operating above ground, the ambient temperature will vary and although the temperature of the liquid is being conveyed may not exceed 20 C, some reduction in strength, and therefore,

of the maximum working pressure at which the pipe may be used will take place. In such cases, the working pressure of the pipe should be re-rated in accordance with graph-1 & graph II. If both the ambient temperature and the temperature of the liquid exceed 20°C, the reduction in working pressure is cumulative and the advice of the relevant person should be sought.



Weights

BSS 3505 does not say any figure for weights. The pipe weights dependent on the formulation and density. Approximate weights of Royal PVC pipes are given in the following table.

Normal Size (Inch)	Class - B Kg/m	Class - C Kg/m	Class - D Kg/m	Class - E Kg/m
3/4	----	----	----	0.22
1	----	----	----	0.32
1 ¼	----	----	0.41	0.50
1 ½	----	----	0.54	0.65
2	----	0.68	0.82	1.03
3	1.17	1.41	1.82	2.22
4	1.78	2.32	3.03	3.65
5	2.44	3.49	4.55	5.51
6	3.46	5.01	6.57	7.95
8	5.30	7.72	10.05	12.17
10	8.26	11.97	15.59	18.89
12	11.55	16.85	21.91	26.68
14	13.87	20.27	26.49	32.16

Combined external loads acting upon a buried pipe are expressed by:

Where P = Combined external load, kg/cm²
 PE = Static earth load, kg/cm²
 Pt = Wheel load, kg/cm²

Relationship between burial depth and combined external loads is given below,

DEPTH		Earth Load	Wheel Load	Combined Load
Cm.	(ft)	Kg/cm ²	Kg/cm ²	Kg/cm ²
30	(1)	0.0493	1.226	1.2753
60	(2)	0.0905	0.546	0.6365
90	(3)	0.1248	0.313	0.3478
120	(4)	0.1533	0.204	0.3573
150	(5)	0.1771	0.144	0.3211
180	(6)	0.1969	0.107	0.3039
210	(7)	0.2135	0.083	0.2965





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COMPANY PROFILE & THCHNICAL MANUAL

- Royal PVC Pressure Pipe
- Royal PVC Electrical Conduit
- Royal PVC Sewerage Pipe
- Royal PVC Fittings
- Royal HDPE Pipe
- Royal PPRC Pipe & Fittings