

PVC-U PRESSURE PIPE SYSTEM

Aquadex
Pressure Pipe System



P
V
C
-
U

PERMANENT SOLUTION FOR COLD POTABLE WATER SUPPLY
PIPELINES AND VARIOUS OTHER APPLICATIONS



DADEX

Introduction

Dadex has been manufacturing unplasticized Polyvinylchloride (PVC-U) pressure pipes since 1991. Dadex has been collaboratively working with experts from world's largest & leading thermoplastic pipe manufacturer. Dadex has state of the art manufacturing equipment for production of PVC-U pressure pipes conforming to Pakistan Standard PS 3051:2012 which is adaptation of British Standard BS 3505 and BS EN 1452.

Available Range of Sizes and Pressure Classes

Dadex PVC-U pressure pipes are available in nominal diameters in standard length of 4m and 6m.

Table # 01

DIAMETERS													
¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"
RATED PRESSURE*													
CLASS		bar / kgf/cm ²				lbf / in ²							
B		6				87							
C		9				130							
D		12				173							
E		15				217							

*Designer has to consider factor of safety while designing system's working pressure. Magnitude of field pressure test is 1.5 times the actual working pressure of pipe line.

Dadex PVC-U pressure pipes comply with relevant national and international standards. Dadex has its own in-house testing laboratory which is equipped with latest testing equipment to ensure quality of the products.

Standards Quality Assurance

Dadex is the only pipe manufacturer in Pakistan producing high quality rubber rings conforming to Pakistan Standard PS 1915:1987 and British Standard BS 2494 Specifications for Z joint PVC-U Pressure Pipes.

Laboratory testing of PVC-U pressure Pipes is carried out as per PS 3051: 2012, BS 3505, BS EN 1452. The testing scheme include following tests:

- Visual Inspection
- Dimensional Analysis
- Resistance to Methylene Chloride Test
- Impact Resistance Test
- Longitudinal Heat Reversion Test
- Resistance to Delamination
- Short Term Hydrostatic Pressure Test
- Vicat Softening Test (Type test)

Advantages

Dadex PVC-U pressure pipes are safe for cold potable water distribution and transmission systems, and can also be used for transportation of certain chemicals, however for special application Dadex Technical Dept should be contacted. The material does not support any microbial growth and prevent contamination of water. The non-corrosive nature of material and leak proof joints limits the tendency of mixing suspended particles and other contaminants, thus ensures risk-free distribution of water.

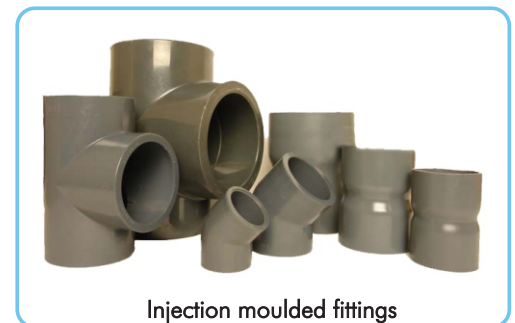


Fields of Application

- Infrastructure Water/Potable Water and Fire-Ring Mains
- Infrastructure Sewer Mains/Pumped or Gravity Flow
- Drainage Installation/Domestic or Industrial
- Industrial Pipelines
- Slurry Lines
- Effluent Lines
- Chemical Plant Installations
- Live Stock Whey Feed Pipes
- Paper Mill Installations: For Alum and Pulp Carrying
- Chilled Water Lines for Refrigeration and Air Conditioning Plant/Cooling Tower
- Coal Washing plant
- Power Station Screening Plant Pipelines
- Power Station Chlorination Plant
- Water Aeration Plant
- Agriculture & Irrigation

Features

- Smooth bore with minimal frictional losses
- Non-flammable/self-extinguishing
- Resistant to chemicals
- Light weight
- Durable
- Non-conductor of electricity
- Non-corrosive and non-abrasive
- Non-contaminating and non-toxic
- Highly resistant to microbial growth



Durability

Non-corrosive quality of Dadex PVC-U pressure pipes prevent degradation of the pipe system. However, prolonged exposure of Dadex PVC-U pressure pipes to sunlight can result in slight color fading.

Excellent Hydraulic Characteristics

Low coefficient of roughness of pipes and joints, smooth surface reduces frictional losses to a greater extent as compared to conventional materials. Low frictional losses ultimately result in reduced costs that are spent on high capacity pumps, maintenance expenditures etc. in case of conventional material.

Non-Conductive & Non-Flammable

The use of PVC-U pipes (buried or above ground) is very much supported by its non-conductive and non-flammable/self-extinguishing property. These outstanding features have made the material suitable for residential, industrial or commercial purposes.

Easy to Handle

Dadex PVC-U pressure pipes are much lighter than ductile iron, steel and reinforced concrete pipes, which significantly reduces transportation and handling costs and result in easy and quick installation.

Resistance to Chemicals

Dadex PVC-U pressure pipes can be used for industrial piping for transportation of various chemicals as it is highly resistant to aqueous salt solution, mineral acids and alkalis. However, it is not recommended for highly concentrated oxidizing agents, organic esters, ketones, aromatic and chlorinated hydrocarbons (for special applications of chemical transportation, "Chemical Resistance chart should be referred").

Resistance to Corrosion

The PVC-U material is corrosion resistant and it is inert to the action of moisture and chemical degradation against various chemical thus the pipe is not attacked by oxidation and rusting.

Temperature Effect

Thermoplastics are sensitive to temperature changes in contrast to conventional materials. Although the softening point of PVC-U is greater than 80°C. At freezing point or below, the increase in volume of water inside will not crack or burst the pipe because of elastic property of the material. Two important characteristics of PVC-U pressure pipes that need to be considered at design stage are the drop in pressure rating at elevated temperatures and the thermal expansion and contraction.

Performance of uPVC Pipe at Variable Temperature

Pressure ratings of PVC-U pipes (as described in Table-01) are designed at 20°C (reference temperature). At higher temperature, reduction in permissible working pressure is necessary to obtain the same service life as at 20°C operating temperature.

Physical Properties

Table # 02

Physical Properties of PVC-U Pressure Pipes at 20°C		
Technical Terms	Typical Value	Unit
Density	1350 ~ 1460	kg/m ³
Modulus of elasticity at 20°C	30,000	kgf/cm ²
Tensile strength at 23°C	450 - 600	kgf/cm ²
Specific heat at 20°C	0.24	Cal/gm/°C
Vicat softening point	85	°C
Thermal conductivity	0.12 ~ 0.14	Cal m / m ² h°C
Coefficient of linear thermal expansion	7-8 x10 ⁻³	mm/m/°C
Inflammability	do not support combustion	-

Marking

Dadex PVC-U pressure pipes are marked with the following information at every meter interval along the length of the pipe.

- Dadex Aquadex
- Material (i.e. PVC-U)
- Relevant standard (i.e BS 3505 / PS 3501), BS EN 1452
- Nominal size of pipe
- Pressure class in bars
- Manufacturing date and shift

Transport

Vehicles with a flat bed should be used for the transport of pipe. The bed should be free from nails and other objects. The pipe should be supported uniformly along its length. Socketed and spigot pipes, should be stacked in alternate layers so that the sockets do not carry any load. Pipe should be loaded on a vehicle in such a way that the overhanging is no more than 1 meter. The thicker walled pipes should always be loaded before thin walled pipes.

Receiving and Handling Pipe Shipments

Inspection

Each pipe shipment is carefully loaded at the factory using standard methods. The transporter is then responsible for delivering the pipe as received from Dadex. Each pipes shipment shall be inspected with care upon arrival by customer's representative.

Check the materials, pipes, rubber rings and fittings received against the Delivery Order in accordance with the general guidelines below, reporting any damage on the Delivery Order and signed by the driver.

- Make overall examination of the load. If the load is intact, ordinary inspection while unloading should be enough to make sure pipe has arrived in good condition.
- If load has shifted or shows rough treatment, then each piece must be carefully inspected for damage.
- Check the total quantities of each item against the delivery order.
- Any damaged or missing items must be noted on the delivery order and returned to the transporter.
- If ex-factory supply then, notify your transporter immediately for claim.
- Do not dispose of any damaged material. The damaged material will be lifted back as per procedure.

Unloading

- Manual unloading of pipes is recommended as PVC-U pipes are light in weight, two men can easily handle the smaller diameter pipes up to size 10" Class C. In case of larger diameter pipe mechanical equipment shall be used.
- However, in all cases handling shall be done with care, pipes and fittings should not be dropped or thrown on to ground or allowed to come into contact with sharp objects.

Warning: PVC-U pipe, though lighter than other material, is still heavy and may be dangerous if not handled properly. Not adhering to the above instructions may result in serious injury, damage to property and/or people. Do not stand or climb on pipe/pipe stack, during unloading.

Notice: Pipe at the bottom of a stack may become out-of-round due to the weight of the material above it. At normal application temperatures this corrects itself soon after the load is removed due to the property of elastic memory. Under freezing conditions, this recovery to full initial roundness may take longer time.

Stacking

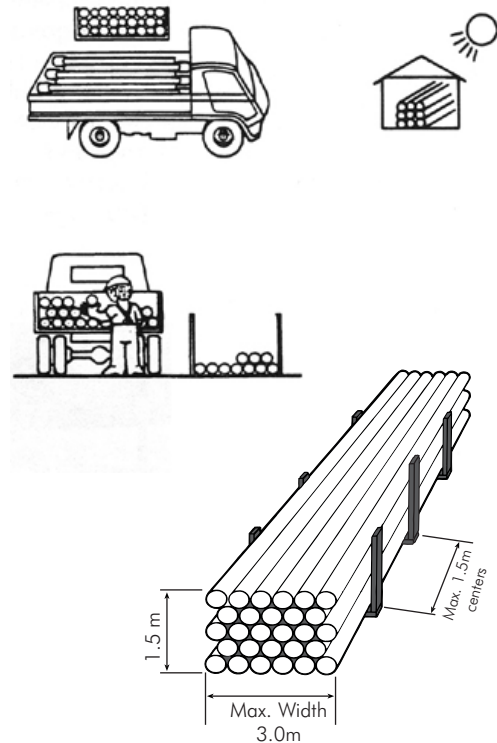
- Store pipe on a flat surface so as to support the barrel evenly, with bell ends and Z-joint sockets overhanging. If unloading by hand, secure two timbers for a base. Set them on a flat area spaced the same as a factory load. Store random lengths separately where they will be readily available. Individual lengths of pipe should be stacked no higher than 1.5 meters. The width of the bottom layer should not exceed 3.0 meters. The bottom layer of pipe may require thicker timber bearers at spacing not greater than 1.5 meters center to center.
- Socketed pipe should be stacked in layers with sockets placed at alternative ends of the stack and protruding to avoid uneven stacks and distortion. The sockets should not be load-bearing.
- It should be noted that when PVC-U pipe is stored outside and exposed to prolonged periods of sunlight, an obvious discoloration of pipe could occur.
- A method of protecting pipe during long exposures to sunlight is to cover it with canvas or other opaque material. Clear plastic sheets are not recommended. Allow for adequate air circulation between the cover and the pipe. This will prevent heat build-up and possible dimensional distortion.

Handling & Storage

Wrong



Right



Loose pipes with sockets must be stored socket end/spigot end alternately to prevent pipes from resting on the sockets.

The maximum height of the stacks should not be more than 1 m. However, if the pipes are stacked on pallets and are secured against lateral movements, the stacking height can be increased to 1.5 m. The maximum distance between the supports and timbers respectively should be 1.5 m center to center.

The section of timbers support shall be approx. 7.5cm x 7.5cm

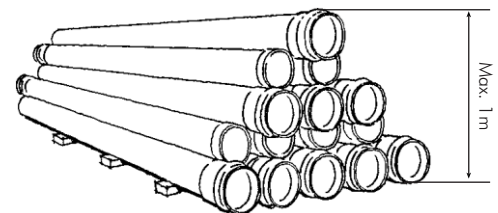
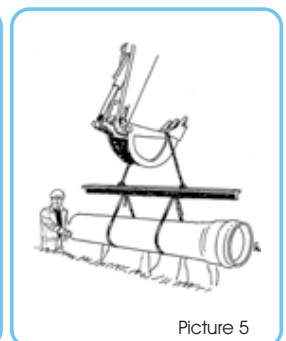
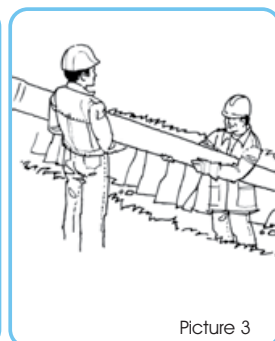
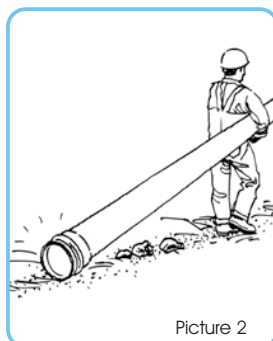
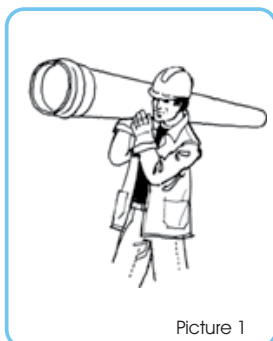


Figure 1

Handling on Site

- 1- Small-diameter pipes (Sizes 2"-10") can easily be carried without the use of auxiliary equipment.
- 2- Do not drag the pipes across the ground and avoid sharp edges.
- 3- Small-diameter pipes can be manually placed in the trench.
- 4- Pipes in larger diameter may necessitate slings. Always use at least 2 ropes.
- 5- Larger diameters may necessitate a special lifting equipment.



Installation Procedure

Pipe Trench

The depth, width and shape of trench depends on the nature of soil, it should be such that the pipe and fittings can be conveniently laid, facilitate adequate compaction of the initial fill with a minimum cover of 900mm above the crown of pipe, the cover of earth should be according to the site conditions, nature of soil and design requirement. Normally for sizes of pipe up to 200mm (size 8") the trench width is recommended to be:

Width of Trench = outside pipe diameter + 300mm + allowance for trench support.

If the ground is rocky then the depth of trench should be increased by at least 0.15 meter and the excavated earth replaced by a stone-free layer. In case of changing layers and consequently changing soil bearing capacity of the trench bottom, provides an adequate fine gravel or sand filling. The minimum excavated depth of the trench for water mains is therefore recommended to be:

Depth of Trench = Outside pipe diameter + 900mm + bedding.

Pipe Laying / Installation

Small diameter pipes could easily be handled without the use of auxiliary tools. When connecting bigger diameter pipes, the use of a bar or power puller to push them into position is recommended.

Note: When applying force to pipe ends using various tools it is recommended to protect pipe's end with wooden block.

After installation, backfill the pipe line between the joints in order to stabilize the pipe before pressure testing is carried out. It is essential that only suitable and well rounded materials to be used in this surround and that adequate compaction under and around the whole pipe is achieved. End plugs should also be anchored before pressure testing, in addition, anchoring or barring should also be provided at bends and tees, if necessary.

Pressure Jointing System

The following jointing systems are available.

- Solvent Cement Joint
- Push Fit Rubber Ring Z-Joint
- Mechanical Joint

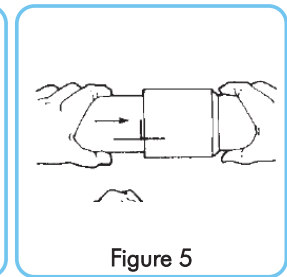
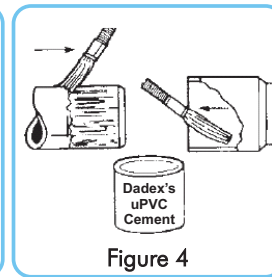
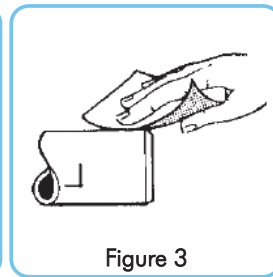
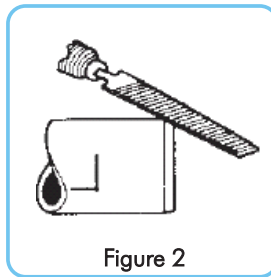
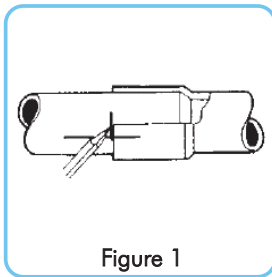
PVC-U Cement Jointing System

Pipes up to 8" may be jointed easily with Dadex PVC-U cement. Larger sizes require more special techniques and require at least two men to handle such joints.

Jointing Instructions

- Clean both surfaces and remove all dust, grease and swarf using a dry clean cloth and cleaner.
- Stir Dadex PVC-U cement thoroughly. Use proper Dadex PVC-U cement. Mark depth of entry of the pipe into the socket and alignment mark.
- Make small chamfer 15° on the edge of the pipe end with medium file.
- Roughen the outside of the pipe and the inside of the socket using sandpaper or emery cloth upto the entry mark.
- Apply Dadex PVC-U cement without delay after cleaning, using a flat clean and proper brush. Apply an even unbroken layer brushing axially to the pipe end and socket mouth with a heavier layer on the pipe. Where loose fits are found, the pipe should be given a second coat.
- Immediately insert the pipe into the socket up to the entry mark, rotate the pipe 1/4th to spread the Dadex PVC-U cement evenly, align pipe and socket. Hold in position for 20 to 30 seconds, and then wipe off excess PVC-U cement.

- PVC-U cement weld jointing of large diameter pipe requires special care. Use sufficient hand power tools to maintain proper alignment.
- Always replace the lid of the can after making a joint and follow the instructions written on the Dadex PVC-U cement can.
- Always use the Dadex PVC-U cement supplied by DADEX.
- Joints should not be moved or disturbed during initial setting time depending on size. Then the joint pipe may be handled with care. Allow 4 hours if the jointed pipe lengths are to be laid in a trench.
- Allow 8 hours to elapse before applying working pressure or 24 hours for test pressures (Please refer figure 1-5) below.



Note: Excessive use of Dadex PVC-U cement could lead to weakening the pipe wall due to PVC-U cement action. The tool required for solvent cement jointing comprise of cutting tool, cotton rags, knife or half round coarse file, natural bristle/brush, safety gloves and safety goggles.

Z- Joint Jointing System

Z-joint has become one of the well-known integral joint for PVC-U pressure pipe systems in the world. The Z-joints possesses excellent sealing mechanism and is presently manufactured by Dadex.

Due to the cavity between the lip and the body of the sealing element, the internal water pressure pushes the body of the ring into the groove and the lip to the outside diameter of the pipe thus giving an excellent sealing.

Assembly Instructions

Dadex supplies standard rubber ring for water and sewerage service with its pressure pipe products.

- Make certain that the rubber ring and socket are clean, with no dirt or foreign material that could interfere with proper seating of the rubber ring or assembly. If necessary, wipe the ring groove and socket with a clean, dry cloth.
- Make sure pipe ends are clean. Wipe with a clean dry cloth around the entire circumference from the end to one inch beyond the reference mark (Please refer figure 1-3) below.



- Lubricate the spigot end of the pipe, using only Dadex or any approved lubricant.
- Be sure to cover the entire spigot end circumference, with particular attention paid to the beveled end of the spigot. The coating should be the equivalent of a brush coat of enamel paint. Lubricant can be applied to the pipe by hand, cloth, pad, sponge or glove. Excessive lubrication of the ring groove may result in displacement of rubber ring during assembly.

Caution: After spigot end is lubricated, do not allow it to contact the bedding material. Small pieces of stone or soil may adhere to the lubricant and may become lodged between the spigot and the rubber ring upon assembly, resulting in a possible leak. (See Figure 2).

- Insert the beveled spigot end into the socket so that it is in contact with the rubber ring. Hold the pipe lengths being joined close to the ground (See Figure 3) and keep the lengths in proper alignment. Brace the socket, as shown, while the spigot end is inserted into the rubber ring, so that previously completed joints in the line are not disturbed. Push the spigot end in until the reference mark on the spigot end is flush with the end of the socket.

Caution: If joint is over-assembled causing the spigot to jam into the neck of the socket, flexibility of the joint is lost. Uneven settlement of the trench or additional loading may cause this type of joint assembly to leak or crack. Do not assemble beyond the reference mark.

If undue resistance to insertion of the beveled end is encountered or the reference mark does not reach the flush position, disassemble the joint and check the position of the rubber ring. Be sure both lengths are in proper alignment.

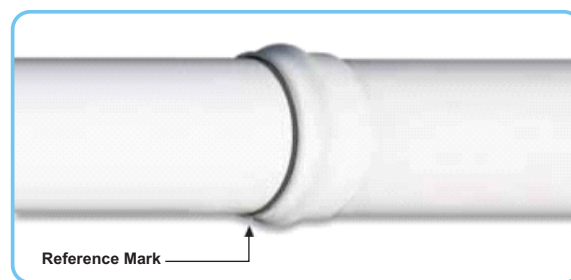


Figure 4

NOTICE: Should a spigot or bell end become deformed under load at higher temperatures, it will be necessary to exercise more care in assembling the joint in order to prevent fish-mouthing of the rubber ring.

Bends & Deflection

Pipe curvatures should be accomplished by bending the pipe rather than deflecting the joint. PVC-U push-fit joint pipes have some degree of flexibility and may be cold bent to accommodate ground contours and road curvatures up to nominal size 6". Pipes larger than nominal size 6" should generally be regarded as rigid and any changes in direction should be recommended by the use of special bends or flexible couplings.

As a general guide, the cold bending radius (R) of a PVC-U pipe length should be not less than 200 times the external diameter, $R_{min} = 200 \times \text{external diameter}$.

Bending should not be attempted in cold weather where the ambient temperature is less than 5°C.

Hydrostatic Pressure Testing for Pressure Mains

It is recommended to test the laid pipeline in accordance to the standard code of practice to check and verify the integrity of joints and overall workmanship. The pipeline section is hydrostatically pressure tested up to a maximum of 1.5 times the actual working pressure for 1 hour.

Note: During field pressure test the pressure derating should be considered at elevated temperature.

Preparation for Field Pressure Test

- After completion of the laying operations, all the elements of the pipeline shall be inspected and tested to ensure the safety and reliability of the network. For large scale networks, the tests are done on sections of maximum length of 500 meters.
- The pipeline is barred/anchored at specified locations prior to pressure testing.
- The pipeline shall be covered up to minimum of 300mm or as per site requirements, well compacted backfill keeping joints exposed for inspection.
- Air relief valves shall be provided at appropriate locations (higher points).
- Filling of pipeline is carried out slowly from the lowest point keeping air valves open to allow air to escape from the air valves.

- In case of Rubber joints (push fit type), the joints shall be kept unstressed and in proper alignment.
- In case of Solvent weld joints field pressure testing shall be carried out after 24 hours has elapsed since the making of last solvent weld joint.
- The temperature of water used for testing shall be $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$.
- Pressure testing shall not be carried out in extremely hot weather conditions, if it is unavoidable then pressure de-rating factor shall be applied (see figure A.1).
- Slowly increase the pressure, preferably using a hand pump until the required pressure is obtained. For pipe lines with large diameters, motorized pumps may be used.
- Isolate the pipeline from the test pump for at least one hour. The test is considered satisfactory if the quantity of make-up water required for re-establishing the required pressure does not exceed the quantity mentioned in table 3.

Table 3

Dia Approx. mm	89	114	140	168	219	244	273	324	355	406
Lit/km Approx.	1	1.2	1.9	2.2	3.6	4.1	4.8	5.1	6.2	7.2

- All defects revealed during the test shall be rectified and a new test carried out until a satisfactory result is obtained.

De-rating factor for service temperatures between 25°C and 45°C

The derating factor f_T for service temperatures up to 45°C shall be taken from figure A.1. The de-rating factor is based on long term experience and test results.

Example: Consider a pipe with class C (9 bar) to be applied for water at 40°C .

From Figure A.1 the de-rating factor at 40°C is 0.71. Therefore the maximum allowable operating pressure at 40°C in continuous use is; $0.71 \times 9 \text{ bar} = 6.39 \text{ bar}$.

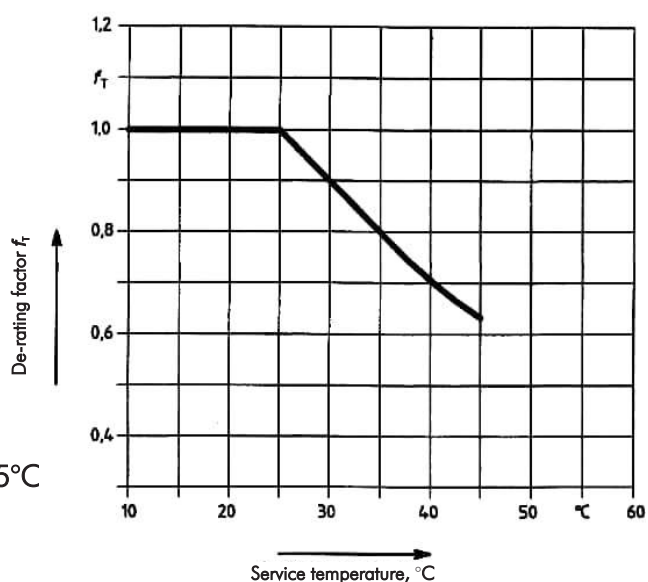


Figure A.1
de-rating factor f_T for service temperatures up to 45°C

De-rating (or up-rating) factor related to application of the system

For applications which need additional derating (or up-rating) factors, e.g. more safety than included in the overall service (design) coefficient of 2.0 or 2.5, an additional factor f_A shall be chosen at the design stage. The allowable operating pressure in continuous use shall be then calculated by: $[\text{PFA}] = f_T \times f_A \times [\text{PN}]$

Where: $[\text{PFA}]$ is the allowable operating pressure.

f_T is the de-rating factor for service temperatures between 25°C and 45°C .

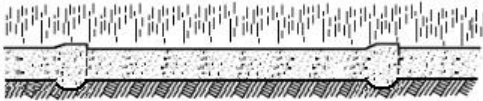
f_A is the de-rating (or up-rating) factor related to the application.

$[\text{PN}]$ is the nominal pressure.

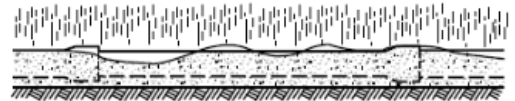
Note: $[\text{PFA}]$ and $[\text{PN}]$ are expressed in the same unit of pressure, preferably in bars.

Backfilling and Tamping

1. Backfilling should follow pipe assembly as closely as possible. This protects the pipe from falling rocks, eliminates possibility of lifting the pipe from grade due to flooding of an open trench, avoids shifting pipe out of line by cave-ins, and in cold weather lessens the possibility of backfill material becoming frozen.
2. The essentials of satisfactory haunching and initial backfilling can be summarized as follows:
 - 2.1 Provide approved materials, properly compacted continuously above the bedding and around the pipe to the springing level, as well as between the pipe and undisturbed trench walls.
 - 2.2 After the bedding of 100 to 150mm thickness compact is done, place the haunching and initial backfill by hand to a 300mm minimum depth of cover above the pipe to give pipe support and cushion.



A. **Right** – Pocket should be provided under joints. Backfill correctly placed by hand filling all voids.



B. **Wrong** – Trench bed without pocket under bell end joint. Backfill not placed evenly.

Side support is accomplished by tamping the soil firmly under the haunches of the pipe out to the trench walls. Tamping should be done in layers no greater than 150mm. If mechanical tampers are used, care should be exercised to avoid damaging the pipe.

For pipes buried under flexible road surfaces at depths less than 1.0 meter, it is recommended that a minimum of 90 percent proctor density be achieved from the bottom of the trench up to the road surface using approved materials.

Final Backfill

The final backfill should be placed and spread in uniform layers 150mm in such a manner as to completely fill the trench with a uniformly dense backfill load on the pipe and avoid unfilled spaces in the backfill. Heavy mechanical compactors/equipments should not be used until a minimum 300mm layer of material above the crown of the pipe. Any trench sheeting should be carefully withdrawn during the backfilling and infill process, to allow proper compaction to occur.

Table # 04 Pipe Dimensions for Classes B, C, D and E (PS 3051 & BS 3505)

Nominal Size	Wall Thickness																			
	Mean Outside Diameter		Class B (6.0 bar)		Class C (9.0 bar)		Class D (12.0 bar)		Class E (15.0 bar)		Class B (6.0 bar)		Class C (9.0 bar)		Class D (12.0 bar)		Class E (15.0 bar)			
			Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value	Average Value	Individual Value
min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	
Inch	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
*3/8	17.0	17.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.9	1.5	1.9
1/2	21.2	21.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1	1.7	2.1
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	2.7	3.2
1 1/2	48.1	48.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.7	3.1	3.7
2	60.2	60.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.5	3.9	4.5
*2 1/2	75.0	75.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.5	4.8	5.5
3	88.7	89.1	3.4	2.9	3.4	4.1	3.5	4.1	3.5	4.1	5.3	4.6	5.3	4.6	5.3	6.5	5.7	6.5	5.7	6.6
4	114.1	114.5	4.0	3.4	4.0	5.2	4.5	5.2	4.5	5.2	6.8	6.0	6.8	6.0	6.8	8.3	7.3	8.3	7.3	8.4
*5	140.0	140.4	4.4	3.8	4.4	6.3	5.5	6.4	5.5	6.4	8.3	7.3	8.3	7.3	8.4	10.1	9.0	10.1	9.0	10.4
6	168.0	168.5	5.2	4.5	5.2	7.5	6.6	7.6	6.6	7.6	9.9	8.8	9.9	8.8	10.2	12.1	10.8	12.1	10.8	12.5
*7	193.5	194.0	6.0	5.2	6.0	8.7	7.7	8.9	7.7	8.9	11.4	10.1	11.4	10.1	11.7	13.9	12.4	13.9	12.4	14.3
8	218.8	219.4	6.1	5.3	6.1	8.8	7.8	9.0	7.8	9.0	11.6	10.3	11.6	10.3	11.9	14.1	12.6	14.1	12.6	14.5
*9	244.1	244.8	6.7	5.9	6.8	9.8	8.7	10.0	8.7	10.0	12.9	11.5	12.9	11.5	13.3	15.8	14.1	15.8	14.1	16.3
10	272.6	273.4	7.5	6.6	7.6	10.9	9.7	11.2	9.7	11.2	14.3	12.8	14.3	12.8	14.8	17.5	15.7	17.5	15.7	18.1
12	323.4	324.3	8.8	7.8	9.0	12.9	11.5	13.3	11.5	13.3	17.0	15.2	17.0	15.2	17.5	20.8	18.7	20.8	18.7	21.6
14	355.0	356.0	9.6	8.5	9.8	14.1	12.6	14.5	12.6	14.5	18.6	16.7	18.6	16.7	19.2	22.8	20.5	22.8	20.5	23.6
16	405.9	406.9	10.9	9.7	11.2	16.2	14.5	16.7	14.5	16.7	21.1	19.0	21.1	19.0	21.9	26.0	23.4	26.0	23.4	27.0
18	456.7	457.7	12.3	11.0	12.7	18.2	16.3	18.8	16.3	18.8	23.8	21.4	23.8	21.4	24.6	-	-	-	-	-
20	507.5	508.5	13.7	12.2	14.1	20.2	18.1	20.9	18.1	20.9	-	-	-	-	-	-	-	-	-	-
22	558.3	559.3	15.0	13.4	15.5	22.1	19.9	22.9	19.9	22.9	-	-	-	-	-	-	-	-	-	-
24	609.1	610.1	16.3	14.6	16.8	24.1	21.7	25.0	21.7	25.0	-	-	-	-	-	-	-	-	-	-

- Pipes are normally manufactured with socket at one end (to suit either Solvent-Cement or Z-joint system); however pipe with both ends plain can also be available.

- Pipe lengths: 4m and 6m.

* Pipe to these nominal sizes are not normally available from stock.

PVC-U Fitting and Valves

Fittings are integral part to complete a piping system, therefore, injection molded and fabricated PVC-U fittings are also available. Dadex offers complete range of finest quality injection molded fittings such as Bends, Tees, Couplers, Threaded Adapters, Reducers and PVC-U Flanges and Valves, these fittings are imported from reliable sources and conform to BS EN 1452-1, BS 3505 and BS 4346 Part 1. Dimensions of these fittings are compatible with Aquadex pipes.

Fabricated fittings are also produced according to the demand of customers (depending upon production capability).

PVC-U Injection Moulded Fittings

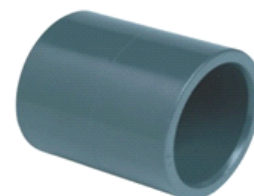
Elbow 90°



Elbow 45°



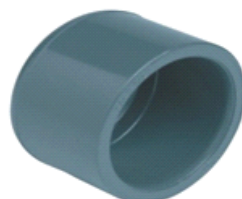
Socket



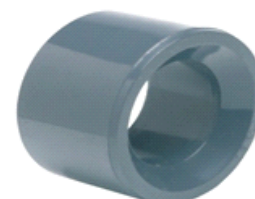
Tee 90°



End Cap



Reducing Bush



Flat Face flange Drilled



Adaptor Female Threaded



Adaptor Male Threaded



PVC-U Injection Moulded Valves

Ball Valve



Butterfly Valve



Dadex PVC-U Antimicrobial Pipes

Dadex is committed to water conservation as well as the supply of safe water for health and well-being of user. For this purpose, Dadex has once again brought a revolutionary technology for the first time in the piping industry of Pakistan, by introducing Antimicrobial pipes containing state of the art Antimicrobial Technology, developed by a UK based company having its network in 98 countries.

Dadex PVC-U pipes have 99.99% antimicrobial efficacy and provide long lasting protection against Bacteria, Fungi and Algae; hence providing safe, clean and healthy water.

Why Dadex Antimicrobial Pipes

Pipes are the backbone of water distribution systems in building and infra-structure, and designed to, last as long as the life span of structure. Water distribution systems provide a suitable milieu for micro-organisms: Bacterial, Fungi and Algae. Microbes which survive in the distribution system possess the ability to grow and produce BIOFILM, a surface deposit of micro-organisms, and organic and inorganic materials that accumulate within a slime layer. Biofilms induce many problems in water distribution systems like: change in color, odor, taste and turbidity of water, mechanism for persistent contamination of water.

The microbial contamination and buildup in water distribution pipes pose a direct risk to public health because of water-borne diseases. Most common disease causing microorganisms associated with water contamination are Pseudomonas, Aeromonas, Klebsiella, E.coli, Helicobacter, Vibrio spp. Shigella, Salmonella, Legionella spp. Aspergillus, Cryptococcus and Mucor. These pathogens can cause serious illnesses like gastroenteritis, diarrhea, dysentery, allergies, skin infections, etc.

- According to WHO (2014), every year approximately more than 3.4 million people die due to water-related diseases, making it the leading cause of morbidity and mortality around the world.
- Approximately 1.8 million people die every year from diarrheal diseases. 90% are children under 5, mostly in developing countries.
- 88% of diarrheal disease are attributed to unsafe water supply, inadequate sanitation and hygiene. (WHO).
- Elderly people, children, people with weak immune system and pregnant women are more susceptible to water borne diseases.

Dadex has made the piping system microbe-free by incorporating Antimicrobial Technology, as bacteria lands on the inner pipe wall, antimicrobial technology eliminates the bacteria and support to provide safe water.

Dadex antimicrobial pipes eradicate the bacteria in pipes surface and protect against the development of microbial biofilm in water distribution systems. The built-in antimicrobial technology becomes an integral part of the finished product.

The antimicrobial additive being used by Dadex in Antimicrobial pipes has been tested against over 50 dangerous micro-organisms including: MRSA, E.coli Salmonella, Klebsiella pneumoniae, Staphylococcus aureus, Pseudomonas aeruginosa, Clostridium difficile, A. niger Corynebacterium spp, Escherichia coli. The Dadex Antimicrobial products have built-in anti-fungal, antibacterial, anti-mold, anti-mildew and anti-algal protection, providing a broad spectrum of total anti-microbial performance.

How Dadex Antimicrobial Pipes Works?

The Antimicrobial Technology provides effective and broad spectrum anti-microbial performance.

Antimicrobial Process - 3 Stages

Stage-1

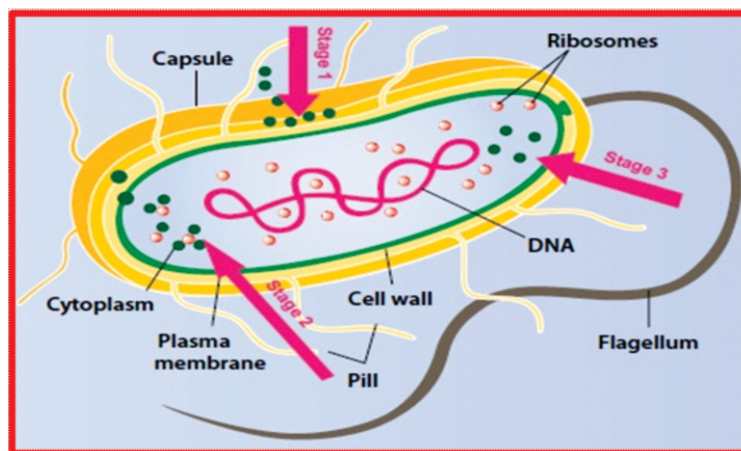
Antimicrobial ability enters the bacterial membrane and cause damage and disruption to the cellular wall before penetrating the cell.

Stage-2

Antimicrobial ability is highly reactive with the cell enzymes and can deactivate these vital molecules.

Stage-3

It interrupts the cell DNA, preventing replication and cell formation. Provides bacterial safe, healthy drinking water.



Features of Dadex Antimicrobial Pipes

- Built-in Antimicrobial Protection against Bacteria, Fungi and Algae.
- Dadex Antimicrobial Pipes are tested by Intertek Laboratories for Antimicrobial performance.
- Maximum protection against water borne diseases and bio-film development.
- 99.99% Antimicrobial efficacy against micro-organisms.
- Effective and long-lasting antimicrobial protection, that keeps the pipe safe from bacteria and provides healthy water.
- Improves water quality and prevents the development of bad tastes and odors in water.

International Standards Compliance

The Dadex Antimicrobial Pipes conforms to the following standards for its antimicrobial efficacy.

Anti-fungal testing → ISO16869:2008, ASTM G21-09 and ASTM E 2180

Anti-bacterial testing → ISO 22196:2011 and JIS Z 2801

Anti-algae testing → ASTM D 5589-09 and prEN WD algae

Dadex Antimicrobial Pipes
A Promise of Healthy Living!

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For Technical information and assistance, please contact Dadex Techno Commercial Department on 111 000 789 or contact Dadex Sales Office near you.

Note : All information contained in this literature is given in good faith. The user should, however, check that the product is suitable for purpose, in the application for which it shall be used. Please ensure compliance with all health and safety requirements. Whilst continuing its programme of continuous development, Seller reserves the right to modify or extend any published information without any prior notification. No responsibility can be accepted for any error, omissions or incorrect assumptions.

"Seller's Responsibility: responsibility of seller ceases once the goods are delivered to the buyer's representative at our factory, where delivery is taken in person. In other cases responsibility of seller shall cease once the goods are delivered to the buyer's/carrier's authorized representative (s). No claims of any type including in-transit loss, damage, pilferage, short-delivery, etc. will be entertained by the seller and the buyer agrees to hold the seller harmless in this regard. Additionally, seller shall not be responsible for any consequential damages including, but not limited to, economic loss of any kind whatsoever, upon the products being delivered to the seller as per the terms of this Clause. Any claim or responsibility as stated herein will not be entertained by the seller and such action will also not be the cause of dispute by the buyer".

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