



THE ULTIMATE SOLUTION FOR uPVC PIPE & FITTINGS



NATIONAL POLYMER INDUSTRIES LTD.

CERTIFICATES

CORPORATE CREED



We believe in corporate governance to direct and control the company in the interest of shareholders and other stakeholders with the aim of sustaining and enhancing the value of the company.

With this in mind we propel our corporate creed ahead:

Mission

The corporate mission is to be a pre-eminent supplier of uPVC pipes & fittings to its customers through product leadership, excellent value and superior quality and service.

Objectives

To promote quality products with the objective of setting benchmarks for industry practice.

To promote and assist in the development of standards, specifications and practices that help ensure the proper use of plastic pipes.

To enhance the knowledge and awareness of contemporary plastic pipeline technologies amongst specifiers, users and installers.

Code of Ethics

Manufacture and supply products and services of the highest quality and optimum value.

Sustain a level of competence expected as a professional operator and only supply such products and services for which NPIL is suitably qualified.

Conduct all aspects of business in a professional and responsible manner.

Engage in fair and open competition based on truthful representation of products and services offered.

Core Values

Customers : Satisfy Customers with highest quality product, service & support.

Excellence : Achieve excellence in people, creativity & imagination.

Integrity : Be honest, upholding values and standards



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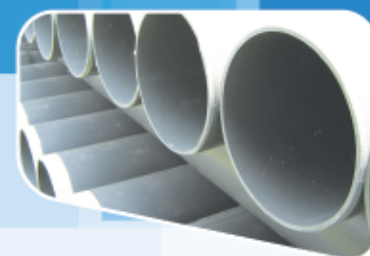
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8. MAJOR CLIENT'S LIST

National Polymer is a Large manufacturer of uPVC (Unplasticised Polyvinyl Chloride) Plastic Pipeline Systems in Bangladesh, and it has continued to progress, successfully developing many export markets. Our comprehensive range of quality uPVC Pipes and Fittings are manufactured in accordance to the requirements of British Standard BSEN 3505, ISO 4422 & 4065 and Singapore Standard SS213. Constant care is taken to maintain these high standard of quality for all our products.

It is now accepted that there are many economic advantages when using uPVC pipes and fittings. They are lightweight, resistant to a wide variety of chemicals, do not support combustion, they are impervious to bacteria and fungi attack and are not subject to electrolytic corrosion. The fittings have a high impact strength which helps prevent damage during handling or assembly. All parts assemble easily and using the simple technique of cold solvent cement welding, together with the use of seal ring joints to accommodate thermal movement there will be considerable economy in labour and materials.

MATERIAL CHARACTERISTICS LIGHTNESS

uPVC is approximately half the weight of copper pipe, one-fifth of the weight of steel pipe and one-tenth the weight of cast Iron Pipe. Transport and handling is therefore both simple and convenient.

CHEMICAL RESISTANCE

The excellent chemical resistance of **NPOLY** uPVC to acids, alkalis, oxidising and reducing agents makes it particularly suitable for a wide range of industrial applications. Generally uPVC is resistant to most oils, fats, alcohols and aromatic-free petrol, but is unsuitable for use with aromatic and chlorinated hydrocarbons, ketones, esters and cyclic ethers which lead to marked swelling and softening of the material.

HIGH FLOW RATE

The internal surface of NPoly uPVC pipes and fittings is "extremely smooth" equivalent to a Manning and Kutter coefficient of 0.010, giving excellent flow properties which remain constant due to reduced build-up of scale.

FLAMMABILITY

NPOLY uPVC does not support combustion.

NON CONDUCTIVITY

NPOLY uPVC is an insulator of electricity, and is therefore not subject to galvanic or electrolytic action.

WEATHER RESISTANCE

NPOLY uPVC Fittings are manufactured from a specially formulated uPVC compound, developed from many years of trial, resulting in a tough resilient material with excellent outdoor weathering performance.

LOW INSTALLATION COST

Tight dependable connections are made by solvent cement welding of uPVC pipe and fittings. This combined with the other advantages of lightness, flexibility and the use of pre-fabrication techniques, can afford savings both in time and money. As it is the case with all materials, certain of their characteristics need to be considered during installation. Similarly, before installing uPVC it is necessary to take into account the following properties.

EFFECT OF LOW TEMPERATURE

The impact strength of **NPOLY** uPVC pipe and fittings decreases with reduction in temperature therefore increased care should be exercised if installations are carried out near 0°C.

EFFECT OF ELEVATED TEMPERATURE

The **NPOLY** uPVC remains stable under load to a temperature of approximately 75°C and is therefore satisfactory for use in soil or waste systems where continuous full bore discharges of effluent are unlikely to exceed this figure. The low thermal conductivity of the material does allow full bore discharges at higher temperatures provided the duration of discharge is limited to 2-3 minutes.



SPECIALIZED APPLICATIONS

The systems are more than adequate for normal domestic applications in low and multi-rise dwellings. Where more specialized applications, such as tea-makers, autoclaves, hospitals, industrial kitchens and laboratories are concerned, where prolonged discharges of liquids at elevated temperatures can occur, the technical department of National Polymer should be consulted.

NPOLY have produced this uPVC Technical Publication to assist engineers, pipeline operators and contractors in the design and installation of pressure pipelines. We believe this manual contains the best technical information available and according to our knowledge and research it is correct in all details. All information is provided in good faith and entirely without prejudice to **NPOLY**.

Polyvinyl chloride is more commonly known by its abbreviated name PVC. It is the oldest and most common plastic, being used in many branches of industry as well as in every day life. It belongs to the thermoplastic group of synthetic materials. It is easily cemented, welded and re-shapeable when heated and can be recycled. Scrap PVC may be re-used. PVC is made by polymerising vinyl chloride. Non-toxic PVC products may contain vinyl chloride monomer residue not exceeding 0.1 ppm.

uPVC requires processing additives for use in extruding, calendering and injection moulding, such as lubricants and stabilisers and if the product is to be of a certain colour, a pigment must be used. All additives together total less than 5%. For **NPOLY** pipe, PVC without plasticizing agents is used, i.e. commonly known as uPVC or unplasticized PVC.

Of all plastics, by far the most widely used in pipe installation is unplasticized polyvinyl chloride (uPVC). It is highly suitable for both interior and exterior applications as well as for buried pipelines.

It has excellent chemical resistance which, combined with smoothness of bore, eliminates build-up of scale and give good flow characteristics which remain constant throughout its working life. Being odourless and tasteless, it is suitable for conveying drinking water and food beverages; it has good abrasion resistance and weathering qualities, and affords good thermal and electrical insulation.

uPVC is light and clean to handle and can be easily jointed. **NPOLY** uPVC pipes are extruded from Unplasticised Polyvinyl Chloride (uPVC) components complying with the relevant standards and are available in sizes from 20mm to 630mm. A comprehensive range of injection moulded uPVC fittings with solvent weld joints are available up to 200mm diameter. It has become an increasingly popular choice in recent years by specifiers in the Water Pipelines, Housing Sector, Commercial Buildings, and other industries. It is suitable for a wide range of pipeline uses and has a number of benefits over traditional materials notably its light weight, corrosion resistance, pliability in sub-zero temperatures and high fatigue strength. uPVC has exceptional resistance to attack from all concentrations of alkalis and to high concentrations of acids, except strong oxidising agents at maximum or near maximum concentrations. The material should not be considered for use with aromatic and chlorinated hydrocarbons, Ketones, Esters and Ethers.



The followings are typical applications for uPVC pipes, provided that working pressure and temperature conditions are within the recommended limits and that the chemical constituents of the fluid to be conveyed and their effect on uPVC have been thoroughly checked.

2.1 NPOLY UPVC PIPES AND FITTINGS ARE SUITABLE FOR

A Wide Variety Of Applications Including-

2.1.1 WATER SUPPLY SYSTEM

Non-toxic **NPOLY** pipes sizes from 0.5" to 24" as per BS 3505 will not affect the taste, odour or smell of drinking water. It does not corrode and is therefore extremely sanitary. Deposit and scale do not build up as in conventional pipes.

2.1.2 IRRIGATION

NPOLY pipes sizes upto 24" as per BS 3505 is ideal for agricultural irrigation and sprinkler systems. **NPOLY** uPVC pipes have found its most effective use in irrigation because it can convey not only water but also liquid fertilizer. Even insecticide can be conveyed by **NPOLY** uPVC pipes to keep trees and vegetables safe from insect attack.

2.1.3 TUBE-WELLS

The tube-well series pipe sizes from 1.25" to 24" as per BS 3505 are free-flowing, anti-corrosive, easily installed, lightweight. These are only a few of the advantages of **NPOLY** pipe. Due to smoothness of both inside and outside surfaces, **NPOLY** uPVC pipes tubewell is free from cohesion of scales and guarantees effective water flow permanently. **NPOLY** well screen also secure a high absorption ratio. For the casings of tube wells larger diameter **NPOLY** pipe is particularly well suited.

2.1.4 PLUMBING

NPOLY pipe sizes range from 0.5" to 2.0" are especially made for plumbing purpose as per BS 3505 specifications for water lines of residential and commercial buildings. A full range of **NPOLY** fittings are available to ensure sound installation.

2.1.5 SWR (SEWER, WASTE AND RAIN WATER)

NPOLY uPVC sewer pipes and fittings are manufactured in grey/white colour with a gloss finish, which is opaque and flawless. This colour reduces absorption of light, and hence minimises the effect to the sun's heat and ultra-violet

radiation. All sewer pipes are repetitively branded in accordance with SS:213 specifications sizes from 32 mm to 630 mm.

Inside buildings and under the ground **NPOLY** uPVC pipes make excellent sewer and drain pipes whenever corrosive gases or liquids are disposed. **NPOLY** uPVC pipes can also be used as rain water drain pipe.

2.1.6 CONDUITS

As a non-conductor of electricity, **NPOLY** uPVC pipes has become a leader in the field of electric conduit. Our electric conduit pipes are available from the sizes 1/2" to 1" as per BS 3505 specifications.

2.1.7 VENTILATION AND DUCT

In factories and laboratories corrosive gases disposed are treated with utmost safety by **NPOLY** uPVC pipe duct. **NPOLY** uPVC pipes is recommendable for the ventilation system.

2.1.8 CABLE DUCTING

These pipes are generally made for protection of electric cables and telephone cables.

2.1.9 INDUSTRIAL USE

Highly chemical resistant, **NPOLY** uPVC pipes is widely used for treating such corrosive chemicals as acids, alkalis, oils, alcohols etc. Thus, with the most successful results, **NPOLY** uPVC pipes have replaced stainless steel, copper, lead, iron pipes etc, has reduced costs considerably.

2.1.10 SEA-WATER

For those who are engaged in handling sea-water through pipe, corrosion is a very serious problem and frequent replacement of steel pipe is an economically heavy burden which is eliminated through the use of **NPOLY** uPVC pipes.

2.1.11 MINING

NPOLY pipes is particularly well-suited for draining corrosive liquids found in mines. It makes an ideal vent line for pits because it is easily installed in hard-to-reach places.

2.1.12 GAS

Due to its inert properties, **NPOLY** pipes are ideal for conveyance of gas and because of its light weight, **NPOLY** pipe can be transported over long distances at low cost. Unlike steel pipes, maintenance costs are minimal.



2.2 ADVANTAGES

NPOLY uPVC pipes is now firmly established as a sound engineering product offering benefits over old traditional materials that justifies acceptance on its own merits. **NPOLY** uPVC pipes offer major advantages in total installation economics, operating efficiencies and significant reductions in maintenance costs when compared with other piping materials.

The principal advantages are summarized as:

2.2.1 EASY INSTALLATION

NPOLY uPVC pipes are light in weight (approximately one-half the weight of aluminium and one-sixth the weight of steel). They have smooth, seamless interior walls. No special tools are required for cutting. They can be installed using solvent cement, threading, flanging and roll grooved jointing techniques.

2.2.2 CHEMICAL RESISTANCE

NPOLY uPVC pipes are inert to attack by strong acids, alkalis, salt solutions, alcohols, and many other chemicals. They are dependable in corrosive applications and impart no tastes or odours to materials carried, nor act as a catalyst. All possibility of contamination, or chemical process changes, and all danger of clouding, sludging, or discoloration are eliminated.

2.2.3 STRENGTH

NPOLY uPVC pipes are highly resilient, tough and durable products that have high tensile and high impact strength. They will withstand surprisingly high pressure for long periods.

2.2.4 FIRE RESISTANCE

NPOLY uPVC pipe products are self extinguishing and will not support combustion.

2.2.5 INTERNAL CORROSION RESISTANCE

NPOLY uPVC pipe resist chemical attack by most acids, alkalis, salts and organic media such as alcohols and aliphatic hydrocarbons, within certain limits of temperature and pressure. They provide the needed chemical resistance, while eliminating the disadvantages of special metals, lined piping, glass, wood, ceramics, or other special corrosion-resisting materials, which formerly had to be used.

2.2.6 EXTERNAL CORROSION RESISTANCE

Industrial fumes, humidity, salt water, weather, atmospheric, or underground conditions, regardless of type of soil or moisture encountered, cannot harm rigid uPVC pipe. Scratches or surface abrasions do not provide points which corrosive elements can attack.

2.2.7 IMMUNITY TO GALVANIC OR ELECTROLYTIC ATTACK

NPOLY uPVC pipe are inherently immune to galvanic or electrolytic action. They can be used underground, underwater, in the presence of metals, and can be connected to other materials, or used as an insulator between them.

2.2.8 CORROSION FREE

With many other pipe materials, slight corrosion may occur. The corroded particles can contaminate the piped fluid, complicating further processing, or causing bad taste, odours, or discoloration. This is particularly undesirable when the piped fluid is for domestic consumption. With uPVC there is no corrosive by-products, therefore, no contamination of the piped fluid.

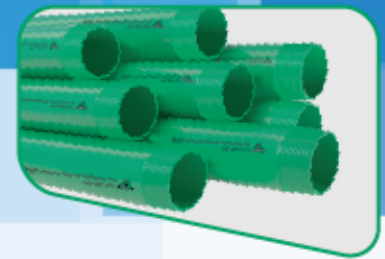
2.2.9 LOW FRICTION LOSS

The smooth interior surface of **NPOLY** uPVC pipe, compared to metal and other piping materials, assure low friction loss and high flow rates. Additionally, since **NPOLY** uPVC pipe will not rust, pit, scale, or corrode, the high flow rates will be maintained for the life of the piping system.

2.2.10 LOW THERMAL CONDUCTIVITY

NPOLY uPVC pipes have 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.

ADVANTAGES



2.2.11 MAINTENANCE FREE

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

2.3 COMPARISON OF NPOLY UPVC PIPE WITH GI, CI AND THE ASBESTOS

The use of uPVC for production of pipes and related products is one of the most important things to happen in this century, where a new material and technology have been able to fulfill the basic needs of daily life.

Traditional material such as steel, cast iron, asbestos suffer from problems of corrosion, health hazards, cost, transportation, breakage and a short as well as uncertain life span. **NPOLY** uPVC pipes involve none of these problems. Some comparisons are listed in the table given below:

Properties	uPVC	Galvanized Iron (GI)	Cast Iron (CI)	Asbestos
Weight	Light weight	Very heavy Weight	Very heavy Weight	Heavy weight
Internal surface	Very smooth	Not smooth	Rough	Not smooth
Durability	50 years	10 years	20 years	No guarantee
Costing	Impartially cheap	Expensive	Expensive	Costlier than PVC
Installation	Very easy	Very Complicated	Very Complicated	Complicated
Water Flow	Satisfactory flow of water	Satisfactory flow reduces after 5 years	Satisfactory flow reduces after 10 years	Not satisfactory
Maintenance	Easy to clean and inspect	Difficult to clean and inspect	Difficult to clean and inspect	Difficult to clean
Effect On Rust	No rust at all	Get rusted	Get rusted	No rust
Health concern	No health hazard	Health hazard	Health hazard	Health hazard

ADVANTAGES OF UPVC PIPES & FITTINGS

- Smooth bore and smooth transition between joints
- High gloss inside and outside surface finish with excellent flow characteristics
- Light weight in handling and installation
- High impact resistance to protect wiring systems from physical damage
- Excellent structural strength
- Superior load bearing
- Exceptional resistance to a wide range of chemicals including strong acid and alkalis
- Resistance to all form of microbiological attacks
- Resistance to all form of corrosion.
- Resistant to weather and rust Fire resistant.
- Non-toxic.
- Solvent cement joint provide leak proof duct run.
- Provide protection against ingress of water and dust.
- Totally immune to galvanic or electrolytic attack to insure a safe system
- Expected life is over 50 years in normal service.



PRODUCT DESCRIPTION

3.1 QUALITY STANDARDS APPLICABLE TO NPOLY UPVC PIPE

NPOLY uPVC pipe is a high quality pipe suitable for pressure pipe line systems in accordance with all the principal international quality standards. It provides the overall framework within which production of uPVC pipes to a particular specification, such as British Standard 3505 and 3506 can take place.

Other specifications are also available that conform to the industry or ISO, ASTM, SS specifications and specialist requirements. All quality control testing for conformity with the various production standards is carried out by the **NPOLY** in house laboratory.

The specifications of BS 3505, BS 3506, ISO 4422, ASTM 1785, JIS K6741 and SS : 213 are shown in table:

BS 3505: 1968

Nominal Size	Outer dia (mm)		Class B (6 bar)		Class C (9 bar)		Class D (12 bar)		Class E (15 bar)		Class 7 (22-40 bar)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Inch	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
0.50"	21.2	21.5	...	...	...	...	...	...	1.7	1.9	3.7	4.3
0.75"	26.6	26.9	...	...	...	...	...	...	1.9	2.1	3.9	4.5
1.00"	33.4	33.7	...	...	...	...	...	...	2.2	2.4	4.5	5.2
1.25"	42.1	42.4	...	...	...	...	2.2	2.4	2.7	3.0	4.8	5.5
1.50"	48.1	48.4	...	...	...	...	2.5	2.8	3.1	3.4	5.1	5.9
2.00"	60.2	60.5	...	...	2.5	2.8	3.1	3.4	3.9	4.3	5.5	6.3
3.00"	88.7	89.1	2.9	3.3	3.5	3.9	4.6	5.1	5.7	6.3	...	...
4.00"	114.1	114.5	3.4	3.8	4.5	5.0	6.0	6.6	7.3	8.0	...	...
5.00"	140.0	140.4	3.8	4.2	5.5	6.1	7.3	8.0	9.0	9.9	...	...
6.00"	168.0	168.5	4.5	5.0	6.6	7.3	8.8	9.7	10.8	11.9	...	...
8.00"	218.8	219.4	5.3	5.8	7.8	8.6	10.3	11.3	12.6	13.9	...	...
10.00"	272.6	273.4	6.6	7.3	9.7	10.7	12.8	14.1	15.7	17.3	...	...
12.00"	323.4	324.3	7.8	8.6	11.5	12.7	15.2	16.7	18.7	20.6	...	...
14.00"	355.0	356.0	8.5	9.4	12.6	13.9	16.7	18.4	20.5	22.6	...	...
16.00"	405.9	406.9	9.7	10.7	14.5	16.0	19.0	20.9	23.4	25.8	...	...
18.00"	456.7	457.7	11.0	12.1	16.3	17.9	21.4	23.6	...	...	...	...
20.00"	507.5	508.5	12.2	13.4	18.1	19.9	...	...	...	...	...	...
22.00"	558.3	559.3	13.4	14.8	19.9	21.9	...	...	...	...	...	...
24.00"	609.1	610.1	14.6	16.1	21.7	25.0	...	...	...	...	...	...



PRODUCT DESCRIPTION



BS 3505 1986

Nominal Size	Mean outside diameter (mm)		Individual outside diameter (mm)		Wall Thickness (mm)								
					9 bar (class C)			12 bar (class D)			15 bar (class E)		
					Average value*	Individual value		Average value*	Individual value		Average value*	Individual value	
Inch	Min	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max
.375"	17.0	17.3	17.0	17.3	...	...	...	...	...	...	1.9	1.5	1.9
0.50"	21.2	21.5	21.2	21.5	...	...	...	...	...	...	2.1	1.7	2.1
0.75"	26.6	26.9	26.6	26.9	...	...	...	...	...	...	2.5	1.9	2.5
1.00"	33.4	33.7	33.3	33.8	...	...	...	...	...	...	2.7	2.2	2.7
1.25"	42.1	42.4	42.0	42.5	...	...	...	2.7	2.2	2.7	3.2	2.7	3.2
1.50"	48.1	48.4	48.0	48.5	...	...	...	3.0	2.5	3.0	3.7	3.1	3.7
2.00"	60.2	60.5	60.0	60.7	3.0	2.5	3.0	3.7	3.1	3.7	4.5	3.9	4.5
3.00"	88.7	89.1	88.4	89.4	4.1	3.5	4.1	5.3	4.6	5.3	6.5	5.7	6.6
4.00"	114.1	114.5	113.7	114.9	5.2	4.5	5.2	6.8	6.0	6.9	8.3	7.3	8.4
5.00"	140.0	140.4	139.4	141.0	6.3	5.5	6.4	8.3	7.3	8.4	10.1	9.0	10.4
6.00"	168.0	168.5	167.4	169.1	7.5	6.6	7.6	9.9	8.8	10.2	12.1	10.8	12.5
8.00"	218.8	219.4	218.0	220.2	8.8	7.8	9.0	11.6	10.3	11.9	14.1	12.6	14.5
10.00"	272.6	273.4	271.6	274.4	10.9	9.7	11.2	14.3	12.8	14.8	17.5	15.7	18.1
12.00"	323.4	324.3	322.2	325.5	12.9	11.5	13.3	17.0	15.2	17.5	20.8	18.7	21.6
14.00"	355.0	356.0	353.7	357.3	14.1	12.6	14.5	18.6	16.7	19.2	22.8	20.5	23.6
16.00"	405.9	406.9	404.3	408.5	16.2	14.5	16.7	21.1	19.0	21.9	26.0	23.4	27.0
18.00"	456.7	457.7	454.9	459.5	18.2	16.3	18.8	23.8	21.4	24.6	...	...	...
20.00"	507.5	508.5	505.4	510.6	20.2	18.1	20.9	...	...	...	...	...	...
24.00"	609.1	610.1	606.5	612.7	24.1	21.7	25.0	...	...	...	...	...	...





PRODUCT DESCRIPTION

BS 3506: 1969

Nominal Size	Mean outside diameter (mm)		Class 0 (non-pr.)		Class B 6 Bar		Class C 9 Bar		Class D 12 Bar	
			Wall Thickness (mm)		Wall Thickness (mm)		Wall Thickness (mm)		Wall Thickness (mm)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
0.50"	21.2	21.5	...	...	...	...	...	...	...	...
0.75"	26.6	26.9	...	...	...	...	...	...	...	...
1.00"	33.4	33.7	...	...	...	...	...	...	...	...
1.25"	42.1	42.7	...	...	...	...	...	...	2.2	2.7
1.50"	48.1	48.4	1.8	2.2	...	...	...	...	2.5	3.0
2.00"	60.2	60.5	1.8	2.2	...	...	2.5	3.0	3.1	3.7
3.00"	88.7	89.1	1.8	2.2	2.9	3.4	3.5	4.1	4.6	5.3
4.00"	114.1	114.5	2.3	2.8	3.4	4.0	4.5	5.2	6.0	6.9
5.00"	140.0	140.4	2.6	3.1	3.8	4.4	5.5	6.4	7.3	8.4
6.00"	168.0	168.5	3.1	3.7	4.5	5.2	6.6	7.6	8.8	10.2
8.00"	218.8	219.4	3.1	3.7	5.3	6.1	7.8	9.0	10.3	11.9
10.00"	272.6	273.4	3.1	3.7	6.6	7.6	9.7	11.2	12.8	14.8
12.00"	323.4	324.3	3.1	3.7	7.8	9.0	11.5	13.3	15.2	17.5
14.00"	355.0	356.0	3.6	4.2	8.5	9.8	12.6	14.5	16.7	19.2
16.00"	405.9	406.9	4.1	4.8	9.7	11.2	14.5	16.7	19.0	21.9
18.00"	456.7	457.7	4.6	5.3	11.0	12.7	16.3	18.8	21.4	24.7
20.00"	507.5	508.5	5.1	5.9	12.2	14.1	18.1	20.9	...	...
22.00"	558.3	559.3	5.6	6.5	13.4	15.5	19.9	22.9	...	...
24.00"	609.1	610.1	6.1	7.1	14.6	16.8	21.7	25	...	...

BS 3506: 1969

Nominal Size	Mean outside diameter (mm)		Class E (15.0 bar)		Class 6		Class 7	
			Wall Thickness (mm)		Wall Thickness (mm)		Wall Thickness (mm)	
Inch	Min	Max	Min	Max	Min	Max	Min	Max
0.50"	21.2	21.5	1.7	2.1	2.8	3.3	3.7	4.3
0.75"	26.6	26.9	1.9	2.5	2.9	3.4	3.9	4.5
1.00"	33.4	33.7	2.2	2.7	3.4	4.0	4.5	5.2
1.25"	42.1	42.4	2.7	3.2	3.6	4.2	4.8	5.5
1.50"	48.1	48.4	3.1	3.7	3.7	4.3	5.1	5.9
2.00"	60.2	60.5	3.9	4.5	...	...	5.5	6.3

PRODUCT DESCRIPTION



ISO 4422-2 : 1996 (E), Table-1

Pipe series S, SDR series and nominal pressure PN equivalents							
Nominal outside diameter d_n	S 16.7 SDR 34.4 PN 6	S 16 SDR 33 PN 6.3	S 12.5 SDR 26 PN 8	S 10 SDR 21 PN 10	S 8 SDR 17 PN 12.5	S 6.3 SDR 13.6 PN 16	S 4 SDR 9 PN 25
	Wall thickness (mm)						
32	...	...	...	1.6	1.9	2.4	3.6
40	...	1.5	1.6	1.9	2.4	3.0	4.5
50	...	1.6	2.0	2.4	3.0	3.7	5.6
63	1.9	2.0	2.5	3.0	3.8	4.7	7.1
75	2.2	2.3	2.9	3.6	4.5	5.6	8.4
90	2.7	2.8	3.5	4.3	5.4	6.7	10.1

ISO 4422-2 : 1996 (E), Table-2

Pipe series S, SDR series and nominal pressure PN equivalents							
Nominal outside diameter d_n	S 20 SDR 41 PN 6.3	S 16 SDR 33 PN 8	S 12.5 SDR 26 PN 10	S 10 SDR 21 PN 12.5	S 8 SDR 17 PN 16	S 6.3 SDR 13.6 PN 20	S 5 SDR 11 PN 25
	Wall thickness (mm)						
110	2.7	3.4	4.2	5.3	6.6	8.1	10.0
140	3.5	4.3	5.4	6.7	8.3	10.3	12.7
160	4.0	4.9	6.2	7.7	9.5	11.8	14.6
180	4.4	5.5	6.9	8.6	10.7	13.3	16.4
200	4.9	6.2	7.7	9.6	11.9	14.7	18.2
225	5.5	6.9	8.6	10.8	13.4	16.6	...
250	6.2	7.7	9.6	11.9	14.8	18.4	...
280	6.9	8.6	10.7	13.4	16.6	20.6	...
315	7.7	9.7	12.1	15.0	18.7	23.2	...
355	8.7	10.9	13.6	16.9	21.1	26.1	...
400	9.8	12.3	15.3	19.1	23.7	29.4	...
450	11.0	13.8	17.2	21.5	26.7	33.1	...
500	12.3	15.3	19.1	23.9	29.7	36.8	...
560	13.7	17.2	21.4	26.7	...	...	...
630	15.4	19.3	24.1	30.0	...	...	...



PRODUCT DESCRIPTION

ISO 4065:1996 (E)

Thermoplastics Pipes- Universal wall thickness table

Nominal Outside diameter	Pipe series S (Standard dimension ratio SDR)																	
	2 (5)	2.5 (6)	3.2 (7.4)	4 (9)	5 (11)	6.3 (13.6)	8 (17)	10 (21)	11.2 (23.4)	12.5 (26)	14 (29)	16 (33)	20 (41)	25 (51)	32 (65)	40 (81)	50 (101)	63 (127)
	Nominal wall thickness																	
32	6.5	5.4	4.4	3.6	2.9	2.4	1.9	1.6	1.4	1.3	1.1	1.0	0.8	0.7	0.5			
40	8.1	6.7	5.5	4.5	3.7	3.0	2.4	1.9	1.8	1.6	1.4	1.3	1.0	0.8	0.7	0.5		
50	10.1	8.3	6.9	5.6	4.6	3.7	3.0	2.4	2.2	2.0	1.8	1.6	1.3	1.0	0.8	0.7	0.5	
63	12.7	10.5	8.6	7.1	5.8	4.7	3.8	3.0	2.7	2.5	2.2	2.0	1.6	1.3	1.0	0.8	0.7	0.5
75	15.1	12.5	10.3	8.4	6.8	5.6	4.5	3.6	3.2	2.9	2.6	2.3	1.9	1.5	1.2	1.0	0.8	0.6
90	18.1	15.0	12.3	10.1	8.2	6.7	5.4	4.3	3.9	3.5	3.1	2.8	2.2	1.8	1.4	1.2	0.9	0.8
110	22.1	18.3	15.1	12.3	10.0	8.1	6.6	5.3	4.7	4.2	3.8	3.4	2.7	2.2	1.8	1.4	1.1	0.9
125	25.1	20.8	17.1	14.0	11.4	9.2	7.4	6.0	5.4	4.8	4.3	3.9	3.1	2.5	2.0	1.6	1.3	1.0
140	28.1	23.3	19.2	15.7	12.7	10.3	8.3	6.7	6.0	5.4	4.8	4.3	3.5	2.8	2.2	1.8	1.4	1.1
160	32.1	26.6	21.9	17.9	14.6	11.8	9.5	7.7	6.9	6.2	5.5	4.9	4.0	3.2	2.5	2.0	1.6	1.3
180	36.1	29.9	24.6	20.1	16.4	13.3	10.7	8.6	7.7	6.9	6.2	5.5	4.4	3.6	2.8	2.3	1.8	1.5
200	40.1	33.2	27.4	22.4	18.2	14.7	11.9	9.6	8.6	7.7	6.9	6.2	4.9	3.9	3.2	2.5	2.0	1.6
225	45.1	37.4	30.8	25.2	20.5	16.6	13.4	10.8	9.6	8.6	7.7	6.9	5.5	4.4	3.5	2.8	2.3	1.8
250	50.1	41.5	34.2	27.9	22.7	18.4	14.8	11.9	10.7	9.6	8.6	7.7	6.2	4.9	3.9	3.1	2.5	2.0
280	56.2	46.5	38.3	31.3	25.4	20.6	16.6	13.4	12.0	10.7	9.6	8.6	6.9	5.5	4.4	3.5	2.8	2.2
315		52.3	43.1	35.2	28.5	23.2	18.7	15.0	13.5	12.1	10.8	9.7	7.7	6.2	4.9	4.0	3.2	2.5
355		59.0	48.5	39.7	32.2	26.1	21.1	16.9	15.2	13.6	12.2	10.9	8.7	7.0	5.6	4.4	3.6	2.8
400			54.7	44.7	36.3	29.4	23.7	19.1	17.1	15.3	13.7	12.3	9.8	7.9	6.3	5.0	4.0	3.2
450			61.5	50.3	40.9	33.1	26.7	21.5	19.2	17.2	15.4	13.8	11.0	8.8	7.0	5.6	4.5	3.6
500				55.8	45.4	36.8	29.7	23.9	21.4	19.1	17.1	15.3	12.3	9.8	7.8	6.2	5.0	4.0
560					50.8	41.2	33.2	26.7	23.9	21.4	19.2	17.2	13.7	11.0	8.8	7.0	5.6	4.4
630					57.2	46.3	37.4	30.0	26.9	24.1	21.6	19.3	15.4	12.3	9.9	7.9	6.3	5.0

SS 213 : 1979

Nominal Size		Mean outside diameter (mm)		Ovality (mm)		Wall Thickness (mm)	
Inch	(mm)	Min	Max	Min	Max	Min	Max
1.25"	...	36.20	36.50	36.10	36.60	2.10	2.40
1.50"	40	42.80	43.10	42.70	43.20	2.30	2.60
2.00"	50	55.70	56.00	55.50	56.20	2.40	2.70
3.00"	75	82.30	82.70	82.10	83.00	3.00	3.50
4.00"	100	110.00	110.40	109.60	110.80	3.20	3.60
5.00"	125	140.00	140.40	139.50	140.40	3.70	4.20
6.00"	150	160.00	160.50	159.50	161.10	4.00	4.50

PRODUCT DESCRIPTION



ASTM D - 1785 : 1989

Nominal Size		Mean outside diameter (mm)		Shedule 40			Shedule 80			Shedule 120		
				Working Pressure	Wall Thickness (mm)		Working Pressure	Wall Thickness (mm)		Working Pressure	Wall Thickness (mm)	
Inch	mm	Min	Max	Kg/ cm2	Min	Max	Kg/ cm2	Min	Max	Kg/ cm2	Min	Max
0.50"	16	21.24	21.44	21.20	2.77	3.28	29.30	3.73	4.24	35.00	4.30	4.90
0.75"	20	26.57	26.77	16.60	2.87	3.38	23.80	3.91	4.42	27.00	4.30	4.90
1.00"	25	33.27	33.53	15.50	3.38	3.89	21.70	4.55	5.08	25.00	5.10	5.70
1.25"	30	42.03	42.29	12.80	3.56	4.06	18.00	4.85	5.43	21.00	5.50	6.10
1.50"	40	48.11	48.41	11.40	3.68	4.19	16.20	5.08	5.69	19.00	5.57	6.40
2.00"	50	60.17	60.47	10.40	3.91	4.42	14.00	5.54	6.20	16.20	6.40	7.10
3.00"	75	88.70	89.10	9.00	5.49	6.15	13.00	7.62	8.53	15.00	8.90	10.00
4.00"	100	114.7	114.53	7.60	6.02	6.73	11.00	8.56	9.58	15.00	11.10	12.40
5.00"	125	141.5	141.55	6.60	6.55	7.34	10.00	9.52	10.66	14.00	12.70	14.20
6.00"	150	168	168.56	6.20	7.11	7.79	9.70	10.97	12.29	13.00	14.30	16.00
8.00"	200	218.70	219.46	5.50	8.18	9.17	8.60	12.70	14.22	13.00	18.20	20.40
10.00"	250	272.70	273.40	4.90	9.30	10.40	8.00	15.10	16.90	13.00	21.40	24.00
12.00"	300	323.50	324.20	4.50	10.30	11.60	8.00	17.50	20.50	12.00	25.40	28.50
14.00"	350	355.20	356.00	4.50	11.10	12.50	7.70	19.10	21.30	...	...	...
16.00"	400	405.90	406.90	4.50	12.70	14.20	7.70	21.41	24.00	...	...	...
18.00"	450	456.70	457.70	4.50	14.30	16.00	7.70	23.80	26.60	...	...	...
20.00"	500	507.40	508.60	4.20	15.10	16.90	7.70	26.20	29.30	...	...	...
24.00"	600	608.80	610.40	4.20	17.50	19.50	7.40	30.94	24.70	...	...	...

ISO 3633 : 2002 (E)

250 MM OUTER DIA UPVC MOULDED FITTINGS DIMENSIONS

Component (Moulded Fittings)	Plain Tee	Plain Bend 90°	End Cap
Material	uPVC	uPVC	uPVC
Height	540 mm ± 5 mm	670 mm ± 5 mm	130 mm ± 2 mm
Socket length	125 mm ± 0.5 mm	125 mm ± 0.5 mm	125 mm ± 0.5 mm
Socket mouth inner diameter	250.9 mm ± 0.2 mm	250.9 mm ± 0.2 mm	250.9 mm ± 0.2 mm
Socket root inner diameter	250.2 mm ± 0.2 mm	250.2 mm ± 0.2 mm	250.2 mm ± 0.2 mm
Wall Thickness	5.0 mm ± 0.1 mm	5.0 mm ± 0.1 mm	5.0 mm ± 0.1 mm
Wall thickness on Rib	7.0 mm ± 0.2 mm	7.0 mm ± 0.2 mm	7.0 mm ± 0.2 mm
Number of socket	3	2	1

3.2 QUALITY ASSURANCE

NPOLY production and technical teams consist of the best and most experienced personnel in the industry. Top down commitment to total quality Management, continuously improving process control parameters and closely controlled system of raw material monitoring, including a series of quality control checks, ensure the quality of the final product. These products are thoroughly tested in BCSIR, BITAC, BUET, RUET, KUET, DUET, CUET and BSTI to determine the standard and inspected by Crown Agents, UK in Bangladesh before storage and marketing. This ensures standardization of all activities in the organization.

NPOLY uPVC pipes and fittings manufactured to international quality standards are widely used in prestigious projects where consistent quality standards, reliability and delivery performance are of paramount importance. This serves as an endorsement of the confidence that professionals and authorities have in our product.



CHARACTERISTIC OF uPVC PIPES

4.0 CHARACTERISTICS UPVC PIPE

The average temperature of fluids to be carried in these pipes should not exceed 65°C. PVC is a synthetic material light in weight, impermeable to fluids and gases and resistant to a wide range of chemicals and has a very high electrical resistivity. It does not support combustion. Here you will find the properties of **NPOLY** pipes at 23°C:

4.1 GENERAL

- Specific gravity : 1.35 to 1.45
- Water absorption in 24 hours : Less than 4 mg/cm² (0.10%)
- Flammability : Will not support combustion; self extinguishing

4.2 PHYSICAL

The most important properties of this versatile and economical material are listed in the following table:
Properties of polyvinylchloride unplasticised (uPVC), average values

Property	Value	Unit
Density	1.38	g/cm ³
Tensile strength	55	N/mm ²
Elongation at break	>30	%
Modulus of elasticity	3000	N/mm ²
Coefficient of linear expansion	0,008	mm/m °C
Max. operating temperature	60	°C
Vicat softening point	>76	°C (VST/B 50)
Water absorption	<4	mg/cm ³
Surface resistance	apprpx.10 ¹³	Ω

4.3 CHEMICAL

uPVC has an excellent resistance to acids, alkalis, salts in all concentration and can handle water with a PH value of 2 to 12. It can resist all kinds of acids used for well regeneration.

4.3.1 HEAT REVERSION

When tested in accordance with the requirements of method 1102 A 1102 B of BS 2782 using a temperature 150° C and appropriate immersion times specified in the table below, the change in length after the conditioning process shall not be more than 5%.

Wall Thickness (mm)	Immersion Time (Min.)	
	Oil Bath	Air Oven
Upto 8.6	15	60
8.7 to 14.1	30	120
Greater than 14.1	60	240

In addition, each test specimen the pipe will show no faults, cracks, cavities or no blisters when visually examined aftercutting the test specimen longitudinally.

CHARACTERISTIC OF uPVC PIPES



4.3.2 RESISTANCE TO ACETONE

When tested by the method described as per BS 509 the sample will show no delimitation or disintegration. Flattening and/or swelling of the pipe will not be deemed to constitute failure.

4.3.3 OPACITY

When tested by the method as per BS 3505, the wall of the pipe will not transmit more than 0.2% of the visible light falling on to it.

4.4 MECHANICAL

4.4.1 IMPACT STRENGTH

NPOLY pipes are tested for impact strength after the specified temperature, length, mass of striker and its height of free fall are followed as per BS 3505.

TENSILE STRENGTH :

Elongation at Break	More than 80%
Modulus of Rigidity	1.12 X 10 ⁴ kgf/cm ²
Modulus of Elasticity	2,600 - 3,000 N/mm ²
Ultimate Tensile Strength	45 - 55 N/mm ²
Maximum Bending Stress	21 kg/cm ²
Flexural Strength	650 - 700 kgf/cm ²
Compressive Strength	600 - 700 kgf/cm ²
Impact Strength : (20° C)	1.0 - 2.0 ft lb/inch of notch.
Impact Strength : (0° C)	0.5 - 1.0 ft lb/inch of notch.





CHARACTERISTIC OF uPVC PIPES

4.4.2 HYDROSTATIC TEST

Short term hydrostatic test as per BS 3505, the pipe will withstand the appropriate minimum internal hydrostatic pressure for at least 1 hour without failure as shown below:

Class and nominal size of pipe	Minimum 1 hour internal hydrostatic pressure	
	bar	(lbf/in ²)
B all sizes	21.6	(310)
C all sizes	32.4	(470)
D all sizes	43.2	(920)
E all sizes	54.0	(780)
Class 6 (0.5" to 1.5")	(100-64)	(1,435-918)
Class 7 (0.5" to 2.0")	(144-79)	(2,066-1,134)

4.5 ELECTRICAL

Dielectric Strength : 40 kv/mm : Non-conductor
 Volume Resistivity : 10^{-5} ohm/cm

4.6 THERMAL

Softening Point (Vicat) : 176° F (80° C)
 Heat distortion temperature at : 75° C (at 18.5 kg/ cm²)
 Specific heat : 0.25 cal/(g°C)
 Co-efficient of heat conductivity : 0.14 K cal/kg/°C
 Thermal conductivity : 4×10^4 cal/kg/°C
 Co-efficient of Liner expansion : 5 to 8.5×10^5 mm/°C
 Expansion on 6 meters length (approx) : 3.2 mm/10° C_{4.7}

4.7 FLOW CHARACTERISTICS

HazenWilliams coefficient : 135 - 150
 Colerbrook coefficient : 0.0000

CHARACTERISTIC OF uPVC PIPES



4.8 CHEMICAL RESISTANCE

⊗: Unaffected 0: Unaffected to little affected Δ: Little affected but recommendable X: Not recommendable

Chemicals	Concentration%	Temperature°C		
		20	40	60
Inorganic Acid				
Sulfurous acid	100	0		X
Hydrochloric acid	Below 30	⊗	⊗	0
	Above 30	⊗	⊗	0
Choloric acid	Below 30	⊗	⊗	0
Choloric water	sat.	0	Δ	
Per chloric	Below 10	⊗	⊗	0
	20	⊗		Δ
Mixed chromic acid			⊗	
CrO ₃ (25):H ₂ SO ₄ (20)aq:(55)		0	0	0
CrO ₃ (40):H ₂ SO ₄ (20)aq:(40)		⊗	⊗	0
Chromic acid	10	⊗	⊗	Δ
	50	⊗	0	X
Chlorosulfonic acid	100	Δ		X
Hydrofluosillicic acid	34	⊗	⊗	Δ
Mixed acid				
H ₂ SO ₄ (57):HNO ₃ (28):aq.(15)		⊗	0	
H ₂ SO ₄ (15):HNO ₃ (20):aq.(65)		⊗	⊗	0
H ₂ SO ₄ (50):HNO ₃ (33):aq.(17)		⊗	0	
H ₂ SO ₄ (48):HNO ₃ (49):aq.(3)		⊗	0	
H ₂ SO ₄ (50):HNO ₃ (50):aq.(0)		0	X	
H ₂ SO ₄ (10):HNO ₃ (20):aq.(70)		⊗	⊗	
H ₂ SO ₄ (11):HNO ₃ (87):aq.(2)		0		
Hydrobromic acid	40	⊗	⊗	0
Bromie	100	X		
Bromic acid	10	⊗		
Nitric acid	Below 30	⊗	⊗	0
	50-60	⊗	0	
	70	Δ	Δ	
	96	X		
Blue acid	100	⊗		
Carbonic acid	100	⊗	⊗	⊗
Fuming sulfuric acid	10	X		
Arsenic acid	Below 30	⊗	⊗	0
	75	0		X
Hydrofluric acid	10	⊗		
	20	0	0	0
	40	0		X
Boric acid	sat.	⊗	⊗	0
Sulfuric acid anhydride	100	⊗		
Sulfuric acid	Below 90	⊗	⊗	0
	96	⊗	0	Δ
	98	0	Δ	
Phosphoric acid	Below 30	⊗	⊗	0
	Above 30	⊗	0	0
Organic Acids				
Adipic acid	sat.	⊗	⊗	0
Benzoic acid	sat.	⊗	⊗	Δ
Oleic acid	100	⊗	⊗	0
Formic acid	Below 50	⊗	⊗	Δ
	Above 50	⊗		X
Citric acid	25	⊗	⊗	⊗
Succinic acid	sat.	⊗	⊗	0
Acetic acid	Below 60	⊗	⊗	0
	85-95	⊗	0	
	Above 95	0	X	X

Chemicals	Concentration%	Temperature°C		
		20	40	60
Glacial acetic acid	100	Δ	Δ	Δ
Diglycolic acid	20	⊗	⊗	⊗
Oxalic acid	9	⊗	⊗	⊗
Tartaric acid	50	⊗	⊗	⊗
Lactic acid	50	⊗	⊗	⊗
	90	X		
Picric acid	5	0		
Phenol	sat.	Δ		X
Benzene sulfonic acid	10	⊗	⊗	0
	50	⊗		Δ
Malleic acid	44	⊗	⊗	0
Methyl sulfuric acid	50	⊗		
Butyric acid	20	⊗		
	100	X		
Alkalies				
Ammonia water	30	⊗	⊗	0
Potassium hydroxide	Below 40	⊗	⊗	0
	Above 40	⊗	⊗	⊗
Calcium hydroxide (slaked lime)	sat.	⊗	⊗	
Sodium hydroxide (caustic soda)	Below 40	⊗	⊗	0
	40-60	⊗	⊗	⊗
Magnesium hydroxide	sat.	⊗	⊗	⊗
Inorganic Salts and other Inorganics				
Sodium sulfite	40	⊗	⊗	⊗
Zinc chloride	sat.	⊗	⊗	⊗
Aluminium chloride	25	⊗	⊗	Δ
Ammonium chloride	27	⊗	⊗	⊗
Potassium chloride	sat.	⊗	⊗	⊗
Calcium chloride	sat.	⊗	⊗	⊗
Mercuric chloride	sat.	⊗	⊗	⊗
Stannic chloride	25	⊗	⊗	Δ
Ferric chloride	sat.	⊗	⊗	⊗
Cupric chloride	sat.	⊗	⊗	⊗
Sodium chloride (common salt)	sat.	⊗	⊗	⊗
Barium chloride	sat.	⊗	⊗	⊗
Magnesium chloride	25	⊗	⊗	⊗
Sodium chloride	sat.	⊗	⊗	⊗
Potassium chloride	15	⊗	⊗	⊗
Potassium perchloride	1	⊗	0	
Hydrozen proxide	20	⊗	⊗	
	40	0	0	
Potassium permanganate	15	⊗	0	0
Potassium persulfate	sat.	⊗	⊗	⊗
Antimony trioxide	sat.	⊗	⊗	⊗
Potassium hypochloride (bleaching powder)	30	⊗		
Potassium bichromate	5	⊗		
	10	0		
Potassium bisulfite	sat.	⊗	⊗	⊗
Potassium nitrate	sat.	⊗	⊗	⊗
Calcium nitrate	50	⊗	⊗	
Sodium nitrate	sat.	⊗	⊗	



CHARACTERISTIC OF uPVC PIPES

⊗: Unaffected 0: Unaffected to little affected : Little affected but recommendable X: Not recommendable

Chemicals	Concentration%	Temperature°C		
		20	40	60
Mercury	100	⊗	⊗	⊗
Ammonium carbonate	sat.	⊗	⊗	⊗
Potassium carbonate	sat.	⊗	⊗	⊗
Potassium ferrocyanide	sat.	⊗	⊗	⊗
Ammonium fluoride	sat.	⊗		
Potassium iodide	sat.	⊗	⊗	⊗
Sodium sulfide	sat.	⊗	⊗	⊗
Zinc sulfate	28	⊗	⊗	⊗
Aluminium sulfate	25	⊗	⊗	⊗
Aluminium potassium sulfate (alum)	sat.	⊗	⊗	⊗
Ammonium sulfate	40	⊗		0
Ferrous sulfate	sat.	⊗	⊗	⊗
Ferric sulfate	sat.	⊗	⊗	⊗
Copper sulfate	15	⊗	⊗	⊗
Sodium sulfate	sat.	⊗	⊗	⊗
Nickel sulfate	sat.	⊗	⊗	⊗
Magnesium sulfate	sat.	⊗	⊗	⊗
Ammonium phosphate	sat.	⊗	⊗	⊗
Sodium phosphate	sat.	⊗	⊗	⊗
Organic Solvents and Other Organics				
Acetaldehyde	100	X		
Acetone	100	X		
Aniline	100	X		
Amyl alcohol	100	0		Δ
Aryl alcohol	100	0		X
Isopropyl alcohol	100	⊗		
Ethyl alcohol	100	⊗	⊗	0
Ethyl ether	100	X		
Ethyl hexanol	100	0		
Ethyl benzene	100	X		
Ethylene glycol	100	⊗	⊗	
Ethylene chloride	100	X		
Methylene chloride	100	X		
Octane	100	⊗		
Octanol	100	⊗	⊗	⊗
Xylene	100	X		
Glycerine	100	⊗	⊗	⊗
Cresol	sat.	Δ		X
Chlorobenzene	100	X		
Chloroform	100	X		
Amyl acetate	100	X		
Ammonium acetate	sat.	⊗	⊗	⊗
Ethyl acetate	100	X		
Butyl acetate	100	X		
Carbon tetrachloride	100	X		
Diethyl phthalate (DOP)	100	X		
Cyclohexanone	100	X		
Cyclohexanol	100	0		Δ
Cyclohexane	100	0		Δ
Dibutyl phthalate (DBP)	100	X		
Dimethyl formamide	100	X		
Tetrachloroethylene	100	X		
Trichloroethylene	100	X		
Toluene	100	X		

Chemicals	Concentration%	Temperature°C		
		20	40	60
Nitro benzene	100	X		
Urea	sat.	⊗	⊗	⊗
Carbon bisulfide	100	X		
Pyridine	100	X		
Butane (liquid)	100	⊗		
Butanediol	Below 10	⊗		
	60	X		
Butyl alcohol	100	⊗	⊗	
Furfural	100	X		
Furfuryl alcohol	100	⊗		
Propone (liquid)	100	⊗		
Benzaldehyde	sat.	X		
Benzene	100	X		
Benzyl alcohol	100	⊗		
Formaldehyde	36	⊗	⊗	0
Methyl alcohol	100	⊗	⊗	Δ
Methyl ethyl ketone	100	X		
Gases				
Sulfare dioxide gas	100	⊗	⊗	⊗
Ammonia	100	⊗	⊗	⊗
Methyle chloride	100	X		
Chlorine, dry	10	Δ	Δ	X
Chlorine, wet	10	Δ	Δ	X
Ozone	100	⊗		
Hydrozen	100	⊗	⊗	⊗
Carbon dioxide	100	⊗	⊗	⊗
Propane	100	⊗		
Butane	100	⊗		
Phosgene	100	⊗		0
Hydrogen sulfide	100	⊗	⊗	⊗
Roasting furnace gas	100	⊗	⊗	⊗

Note: In the concentration column, "sat." means saturated aqueous solution and numbers other than 100 indicate the concentrations of aqueous solution in percentage.



5.1 INSTALLATION

Solvent Cementing uPVC Pipes and Fittings

5.1.1 GENERAL

The conventional method of jointing uPVC pipes is the application of solvent cement. All solvent cement joint pipes have one end to be socketed before jointing. Almost all uPVC fittings are solvent joint.

5.1.2 BASIC PRINCIPLES OF SOLVENT CEMENTING

To make consistently good joints the followings should be clearly understood:

1. The jointing surfaces must be softened and made semi-fluid.
2. Sufficient cement must be applied to fill the gap between pipe and fittings.
3. Assembly of pipe and fittings must be made while the surfaces are still wet and fluid.
4. Joint strength develops as the cement dries. In the tight part of the joint the surfaces will tend to fuse together, in the loose part the cement will bond to both surfaces.

Penetrating and softening can be achieved by the use of both primer and cement. A suitable primer will usually penetrate and soften the surfaces more quickly than the cement alone. Additionally, the use of a primer can provide a safety factor for the installer, for he can know, under various temperature conditions, when he has achieved sufficient softening. For example, in cold weather more time and additional applications are required.

5.2 PRIMERS AND CEMENTS

5.2.1 PRIMER

It is recommended that a high quality primer be used to prepare the surfaces of pipe and fittings for solvent welding. Do not use water, rags, gasoline, or any other substitute for cleaning uPVC surfaces.

5.2.2 CEMENT

Make sure the solvent cement used is suitable for the type and size of the pipes being installed.

uPVC cement must be used with uPVC pipe and fittings. Also, cement with the proper viscosity for the type and size of pipe, must be used. Contact the supplier of the cement if there are any questions on the suitability of the cement for the intended application.

Solvent cements are formulated to be used "as received" in original containers. Adding of thinners to change viscosity is not recommended. If the cement is found to be jelly-like and is not free-flowing, it should not be used. Containers should be kept covered when not in actual use.

Solvent cements should be stored at temperatures between 40°F and 110°F and away from heat of open flame. The cements should be used within one year of the date stamped on the container. Stocks should be constantly rotated to prevent build-up of old cement inventories. If new cement is subjected to freezing it may become extremely thick or gelled.

This cement can be placed in a warm area where, after a period of time, it will return to its original, useable condition. But this is not the case when gellation has taken place because of actual solvent loss; for example, when container was left open too long during use or not sealed properly after use. Cement in this condition has lost its formulation and should be discarded. Solvent cements and primers are extremely flammable and should not be used or stored near heat or open flame. They should be used only with adequate ventilation. In confined or partially enclosed areas, a ventilating device should be used to remove vapors and minimize their inhalation. Containers should be kept tightly closed when not in use and covered as much as possible when in use. Avoid frequent contact with the skin. In case of eye contact, flush repeatedly with water. Keep out of reach of children.



5.2.3 APPLICATORS

To properly apply the primer and cement, the correct size and type of applicator must be used. There are three basic types of applicators:

Daubers -should only be used on pipe sizes 2" and below.

Brushes -can be used on any diameter pipe, should always have natural bristles, and should have a width equal to at least 1/2" the diameter of the pipe.

Rollers -can be used on 4" and larger diameter pipe and should have a length equal to at least 1/2" the diameter of the pipe.

5.3 HANDLING AND STORAGE OF UPVC PIPE

5.3.1 RECEIVING PIPE

As the pipe is received, it should be visually inspected for any damage which may have occurred during transit. The ends of the pipe should be checked for any cracks or splits. The pipe should also be checked for any severe deformation which could later cause joining problems.

5.3.2 HANDLING PIPE

The pipe should be handled with reasonable care. Because uPVC pipe is much lighter in weight than metal pipe, there is sometimes a tendency to throw it around. This should be avoided. The pipe should never be dragged or pushed from a truckbed. Pallets of pipe should be removed with a forklift. Loose pipe can be rolled down timbers, as long as the pieces do not fall on each other or on any hard or uneven surface. In all cases, severe contact with any sharp objects (rocks, angle irons, forks on forklifts, etc.) should be avoided.

5.3.3 STORING PIPE

If possible, pipe should be stored inside. When this is not possible, the pipe should be stored on level ground which is dry and free from sharp objects. If different schedules of pipe are stacked together, the pipe with the thickest walls should be on the bottom. If the pipe is in pallets, the pallets should be stacked with the pallet boards touching, rather than pallet boards being placed on the pipe. This will prevent damage to or bowing of the pipe.

The pipe should be protected from the sun and be in an area with proper ventilation. This will lessen the effects of ultraviolet rays and help prevent heat build-up.

If the pipe is stored in racks, it should be continuously-supported along its length. If this is not possible, the spacing of the supports should not exceed three feet (3').

When storage temperature are below 32°F, extra care should be taken when handling the pipe. This will help prevent any problems which could be caused by the slightly lower impact strength of uPVC pipe at temperatures below freezing.



6.1.1 PREPARATION

Before starting to make any joints, the pipe and fittings should be visually inspected for any damage or defects. The fittings should be exposed to the same temperature conditions as the pipe, for at least one hour prior to installation, so that the pipe and fittings are basically at the same temperature when joined.

6.1.2 CUTTING

Cut pipe square using a miter box or a plastic pipe cutting tool which DOES NOT flare up diameter at end of pipe.

6.1.3 DEBURRING AND CHAMFERING

Remove all burrs from end of pipe with a knife, file, or plastic pipe deburring tool. Chamfer (bevel) the end of the pipe at an angle of 10-15 degree.

6.1.4 CLEANING

Remove any dirt, moisture, or grease from pipe end and fitting sockets with a clean dry rag. A chemical cleaner must be used if the wiping fails to clean the surfaces.

6.1.5 DRY FITTING

Check dry fit of pipe and fittings by inserting pipe into fitting. With light pressure, pipe should easily go at least 1/3 of the way in. If it bottoms, it should be snug.

6.1.6 PRIMING

Using the correct applicator, apply primer freely to fitting socket, keeping the surface and applicator wet until the surface has been softened. This will usually require 5-15 seconds, More time is needed for hard surfaces and in cold weather conditions. Redip the applicator in primer as required. When the surface is primed, remove any puddles of primer from the socket. A second application in the socket is recommended if it has unusually hard surfaces. These hard surfaces are often found in belled-ends and in fittings made from pipe stock. Apply the primer to the end of the pipe equal to the depth of the fitting socket. Application should be made in the same manner as was done on the fitting socket.

6.1.7 CEMENTING

While the surfaces of the pipe and fitting are still wet with primer, immediately apply a full even layer of cement to the pipe equal to the depth of the socket. Apply a medium layer of cement to the fitting socket. Do not let the cement puddle. Also, when joining belled-end pipe, do not coat beyond the bell depth or allow the cement to run down the inside of the pipe.

Apply a second full even layer of cement to the pipe. Assemble parts QUICKLY! Parts must be assembled while cement is still fluid. If assembly is interrupted, recoat parts and assemble. Push pipe FULLY into fitting, using a turning motion, if possible, of 1/8 to 1/4 turn, until it bottoms. Hold them together for 15-30 seconds to offset tendency of pipe to move out of fittings. With a rag, wipe off excess bead of cement from juncture of pipe and fitting.

Note: For pipe sizes 6" and larger, two people will be required, a mechanical forcing device should be used, and the joint should be held together for up to 3 minutes.

6.2 BELL-END JOINT

Bell-end joint is a rubber ring jointing system in which jointing is done by means of pushing a uPVC pipe to the moulded Bell-End Socket of another pipe.

6.3 ADVANTAGES OF BELL END UPVC PIPES

There are several advantages of using the NPoly Bell-End Pipes, and some of the major one are given below:

1. Bell-end pipes require no additional fitting, resulting in easier and faster jointing. Reduce installation cost.
2. The Bell-end socket of the pipe is factory made therefore its specifications are uniform and guaranteed, reducing the risk of "faulty joints."
3. The inherent property of the Bell-end joint provides an area to cater for the absorption of the expansion of the uPVC pipe line.
4. Bell-end joint are negative pressure tested which safeguard any water or fluid to enter the pipe via the joint.
5. Pipe can be re-installed without any risk of wasting or cutting any length of pipe.



7.1 NPOLY UPVC FITTINGS

NPoly pioneered the replacement of using conventional materials i.e. galvanized iron (GI) and cast iron (CI) and introduced the use of uPVC pipes and fittings in the housing construction as a superior solution. Excellent structural strength, easy transportation and installation, minimum maintenance, reduced frictional losses, lower combustibility & flammability, resistance to wide range of chemicals & bacterial growth, non-toxic, non-corrosive and non-clogging features, longer expected life and cost effectiveness turned these products as a preferred material for most of the piping systems used in the housing projects.

uPVC Pipes and fittings are now firmly established as a sound engineering product offering benefits over conventional materials that justifies acceptance on its own merits. The system has been rationally accepted by the architects, engineers, operators and contractors and new solution is being adapted for use in the housing sector by the different public and private institutions.

APPLICATIONS

NPoly uPVC Pipes and Fittings are suitable for application in:

- Pipelines Systems for building application Sewer, waste, rain water disposal and vent
- Electric conduit systems, Major portable water supply, Industrial process pipelines
- Effluent pipelines for industrial wastes, Irrigation,
- Turf watering systems
- Water transportation pipelines

7.2 NPOLY SWR FITTINGS



NPOLY FITTINGS

OTHER PRODUCTS & SERVICES



7.2.1 NPOLY SWR FITTINGS



Vent Cowl



45° Plain Y Junction



45° Plain Reducing Y Junction



Plain Socket



Plain Door Tee



Door Socket (Test Open)



Multi-Function P Trap



Multi-Function P Door Trap



Sipon Trap (Two Part)



Multi-Function Trap Body (M/F)



End Cap



Access Pipe With Plug (Door Cap)

NPOLY FITTINGS

7.2.2 NPOLY ELECTRIC CONDUIT FITTINGS



Socket



90° Bend



Circular Box (Single)



Circular Box (Double)

7.2.3 NPOLY SOLVENT CEMENT SERIES



Npoly Teflon Tape



Npoly Solvent Cement



7.3 PLUMBING FITTINGS



90° Equal Elbow



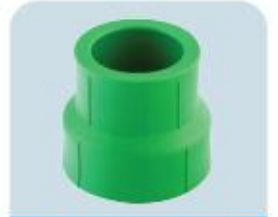
90° Faucet Elbow



90° Reducing Elbow



Plain Socket



Reducing Socket



Plug



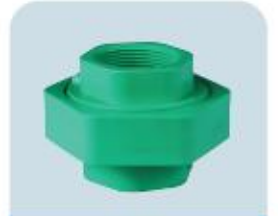
Equal Tee



Equal Faucet Tee



Reducing Tee



Union



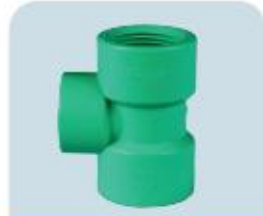
Reducing Faucet Tee



00000



Reducing Elbow



Tee



Socket

PLUMBING FITTINGS & SOCKET





7.4 NPOLY HAND WATER PUMPS NO.6

Npoly Self Priming Water Pump is a new addition in the product-line of National Polymer Group, a well reputed business company in Bangladesh. Imported directly from China, the Npoly Water Pump is superior in quality which is made of modern and proficient technology. This pump will give you more assurance in lifting water from any source.

This pump is mostly used for agriculture, industry and all type of Real Estate project.

Experienced technician and capable Sales Representative of National Polymer will give you utmost technical support and post-sales services.

Npoly Water Pump ensures your useful investment and extended water supply with less price and less electricity cost.

The maintenance cost of this superior quality water pump is also very little.

Contact immediately with your nearest dealer for the water pump to ensure more water supply in residential, commercial and agricultural purposes.

7.5 NPOLY HAND PUMPS

Providing safe drinking water and adequate food supplies for the rapid growing population has always been a priority for the people of Bangladesh. NPoly's aim is to provide safe water to the rural population which has prompted NPoly to start manufacturing and fabricating Hand Pumps and Centrifugal Pumps using local materials, skills and all the necessary uPVC tubing for drinking water and irrigation. The pump's main features are its simplicity, low cost, and ease of maintenance.

7.6 HAND PUMPS FOR DRINKING WATER

- 1) No 6 Hand Pump (Suction type)
- 2) Tara (Pressure mode type)
- 3) Tara II Pump (Pressure mode type)
- 4) Tara Dev (Pressure mode type)

7.7 CENTRIFUGAL PUMPS FOR IRRIGATION

Centrifugal Pump (Shallow tubewell)

NPoly is offering a comprehensive package which includes boring, installation and platform construction implemented by specialized teams. To facilitate easy joining, installation, repair, maintenance and after sales services, NPoly also provides basic tools and accessories as part of total package ensuring supply from a single source.





7.8 NPOLY FILTER

Npoly roboscreen filter is made from rigid uPVC pipe having 1.5" nominal diameter as per BS 3505, Clas 'D'. It is extruded with 8 internal ribs. The physical specifications are as below :

Specifications of blank pipe :

Wall Thickness	: 2.5 to 3.0mm
Outside diameter	: 48.1 to 48.4 mm
Inner dia (rib to rib)	: 39 mm
Overall length	: 2 meters
No of ribs	: 8 Nos

Specifications of Slot :

Slot with	: 0.2 mm(± 0.02 mm)
Slot pitch	: 1.5 mm
Ends	: Both end plain spigot and clear from slots over a length of 35 mm
Color	: Gray

Beside this there are ten slotted filters named Filter No 4, 6, 8 & 10 for the whole sale market, which are widely used all over Bangladesh.

7.9 BOTTLE COMPOUND

Npoly also produces all grade of PVC Bottle Compound with the technical collaboration and know-how from the world renowned Company - Kanegafuchi Chemical Industry, Japan for the finish products (Jars) for cosmetics, drinking water and containers for general use. NPoly Bottle compounds have also received Food Grade Certification from Japan Hygienic PVC Association.

7.10 ENVIRONMENTAL MANAGEMENT

In the project, dust particles from mixer blower and pipe cuttings, rejects, deformation, die clogs etc coming out of operation are waste products. NPoly has installed a cyclone separator to arrest dust particles and has also installed one locally fabricated pipe extruder to use pipe cuttings, rejects etc for production of low value uPVC pipes. As such, the project does not generate any disposable waste or effluent, which may pose environmental and ecological problems. However, as per provisions of the Environmental Act, NPoly has obtained a No Objection Certificate (NOC) from the Department of Environment, Government of Bangladesh in this respect.

7.11 SERVICE IS OUR BUSINESS

NPoly is a company with well-trained professionals who know that the excellence of their individual service is the key to the growth of the company's development. NPoly also offers continuous service through efficient communications and developed computerization systems in order to meet customers' needs and wants. Even the tiniest detail contribute towards quality, reliability and total peace of mind for NPoly products. Each step of the product's journey is considered to be an end in itself. Flawless engineering skills and a quick service has made NPoly products the first choice among end users. NPoly is committed towards fulfilling its vision by providing meticulous service to all customers. We at NPoly believe that economic emancipation gear a new definition only when the benefits of progress reach the common man.

CPVC A UNIQUE SOLUTION FOR HOT AND COLD WATER DISTRIBUTION SYSTEM.



7.12 NPOLY CPVC PIPES AND FITTINGS

Having a Glorious background of manufacturing uPVC Pipes. National Polymer Industries Ltd. has launched a new Product (CPVC). Chlorinated Polyvinyl Chloride Pipes and Fitting As per Standard ASTM D-2846. CPVC Pipes and Fittings is Compatible for Both hot and Cold Water Distribution System. CPVC has been used for hot and Cold Water Distribution In the United States Since-1960. CPVC is used Compared to Metal Pipe. CPVC uses a Simple Solvent Cement Jointing Method. CPVC Pipes can Meet the temperature up to 180F (82°C) Proven by ASTM Testing. CPVC Pipes are Product In Copper Tube

Size (CTS) From 15mm (1/2") to 50mm (2") With two Different Standard Dimensional Ratios SDR 11 and SDR 13.5 Which meet Standard ASTM D-2846 and ASTM F- 442. CPVC has Approved by NSF International of USA, Deutscher Verein des Gas-und Wasserfaches (DVGW) of Germany, Water Research Council (WRC) of UK, Bangladesh University of Engineering and Technology (BUET) of Bangladesh. CPVC Pipe and Fittings and Solvent Cement is Available to Distribute Through our Sales Network In Whole Bangladesh.

Comperative Table of Different Types of CPVC Pipes

Pipe	Temperature (°C)	Pressure Rating (PSI) (Kg/Cm ²)	
SDR 11	23	400	28.1
	82	100	7.00
SDR 13.5	23	320	22.5
	82	80	5.6

Solvent Cement

- High Quality Performance with excellent Installation properties.
- Reduced fumes and odor for the comfort pipe installers.
- NSF, UPC and/or CSA Listed.
- Meet ASTM Standards for solvent cements used for plastic pipe installation.
- Environmentally Responsible.





APPLICATION FIELD OF CPVC BENEFITS OF CPVC FEATURES OF CPVC

Application Field of CPVC

- Household pipeline system.
- High and low rise Buildings.
- Corporate and Commercial houses.
- Academic Institutions.
- Multistored hotels.
- Resorts.
- Hospitals.
- Apartments.
- Production transmission system of beverage and medicine Industries.
- Condensation pipe line for central air conditioner.

Benefits of CPVC

- Cost Effective.
- Superior Insulation.
- Fire safety.
- Approved world wide.
- Both hot and cold water compatible.
- High heat preservation.
- Easy Installation.
- Long Lasting.

Features of CPVC

- Use of solvent cement
- Lower Bacterial Growth.
- High Pressure Endurable.
- Chemical Resistance.
- Corrosion Resistance.
- Kink Resistant.
- Reliable Solvent Cement Joint.
- No Special tools Required for Jointing.
- Perfect Replacement of metal Pipes.
- Low Thermal Expansion.
- Unaffected by Chlorine In the Water.

CPVC Pipes and Fittings At a Glance



PIPE



90° ELBOW



TEE



UNION



BRASS FPT TEE



CROSS TEE



MALE-ADAPTER-BRASS-THREAD



FEMALE-ADAPTER-BRASS-THREAD



BRASS MPT 90° ELBOW



BRASS FPT 90° ELBOW



BRASS MALE ADAPTER



BRASS FEMALE ADAPTER

DIMENSION OF CPVC PIPE AND FITTINGS



CPVC Pipes and Fittings At a Glance



DIMENSION OF CPVC

PRODUCT AVAILABILITY

PIPES	SIZE	PRESSURE RATING	FITTINGS
CPVC PIPES Class 1 (SDR-11)	15 mm (½") - 20 mm (¾") - 25 mm (1") 32 mm (1¼") - 40 mm (1½") - 50 mm (2")	@ 27°C 28.1 kg/cm ² @ 82°C 6.93 kg/cm ²	As per ASTM D 2846 Sizes 15 mm (½") to 50 mm (2")
CPVC PIPES Class 2 (SDR-13.5)	15 mm (½") - 20 mm (¾") - 25 mm (1") 32 mm (1¼") - 40 mm (1½") - 50 mm (2")	@ 27°C 22.5 kg/cm ² @ 82°C 5.6 kg/cm ²	As per ASTM D 2846 Sizes 15 mm (½") to 50 mm (2")
CPVC PIPES SCH-40 as per ASTM F441	65 mm (2½") - 80 mm (3") - 100 mm (4") - 150 mm (6") - 200 mm (8") - 250 mm (10") - 300 mm (12")	Depending on the size of pipe*	As per ASTM F - 441 SCH 40 sizes above 50 mm (2")
CPVC PIPES SCH-80 as per ASTM F441	65 mm (2½") - 80 mm (3") - 100 mm (4") - 150 mm (6") - 200 mm (8") - 250 mm (10") - 300 mm (12")	Depending on the size of pipe*	As per ASTM F - 441 SCH 80 sizes above 50 mm (2")





PP-R POLYPROPYLENE RANDOM

7.13 NPOLY PP-R (POLYPROPYLENE RANDOM)

Having a glorious background of manufacturing uPVC Pipes, National Polymer Group has launched a new product PP-R (Polypropylene Random) Pipes and Fittings made through German Technology with German raw materials which are same as the Euro-made PP-R Products. These products are compatible for both Hot and Cold water supply purpose.



NPOLY PP-R FITTINGS

MAJOR CLIANT LIST



7.14 NPOLY MAJOR CLIANT LIST

OUR CLIENT



Bashundhara City



Hotel Radisson



Hotel Seagull



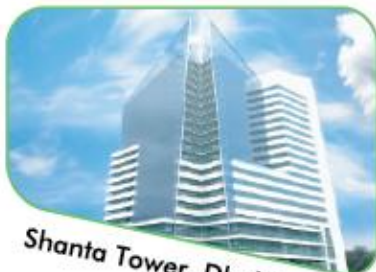
Royal Thai Embassy



Ever Care (Apollo Hospital)



City Centre



Shanta Tower, Dhaka



ASA Tower



North South University



Square Hospital



United Hospital



Metro-Rail-Project



ABC Heights



Padma Bridge



Dhaka Regency



OUR PROMINENT CUSTOMERS

Today, while enjoying a growing market base, NPoly is relentlessly marching ahead in search of new horizons.

GOVERNMENT INSTITUTION

Department of Public Health Engineering (DPHE)
UNICEF financed GOB Project

BTRC

HYSAWA

ADB

BMDA

BADC

Dhaka WASA

Chittagong WASA

Rajshahi City Corporation (RCC)

Khulna City Corporation (KCC)

EPZ, Savar, Dhaka

AH EPZ IBD

Rural Development Academy, Bogra

PAURASHAVA (S):

Mymensingh

Comilla

Bogra

Jessore

Barisal

Kushtia

Faridpur

Bagerhat

Pabna

Tangail

Jamalpur

Sylhet

Rangpur

Dinajpur

Jhalkati

Chandpur

Rangamati

Bandarban

Brahmanbaria

Hobiganj

Sunamganj

Rajbari

Meherpur

Gaibandha

Tongi

Gazipur

Sirajganj

Lakshmipur

Borguna

Bhola

Manikganj

Moulvibazar

Sherpur

Netrokona

Magura

Satkhira

Narail

Meherpur

Nilphamari

Lalmonirhat

Nowgaon

Joypurhat

Thakurgaon

Panchagarh

Sariatpur

REAL ESTATE & DEVELOPERS

ABC Real Estate Ltd.

Advance Development Technologies Ltd.

Angan Structural Devt. & Engineers Ltd.

Asset Development & Holdings Ltd.

Assurance Development

Ativo Properties Ltd.

Avenue Builders Ltd.

Bestway Foundation Ltd.

Beximco Engineering Ltd.

Bio Properties

Biswas Builders Ltd.

Borak Real Estate Ltd.

Bridge Holdings Ltd.

Buildings for future

Charuta Homes Ltd.

City Homes Ltd.

Concord Group

Confidence Builders Ltd.

Design & Design Ltd.

Dynesty Developments Ltd.

Earth Holding Ltd.

ENA Properties Ltd.

Estern Housing Ltd.

Gawsia Developers Ltd.

H I Technologies & Properties

Home Design Ltd.

Imagine Developments Ltd.

Imperial Consultant & Developments

Index Construction Ltd.

Japan Garden City Ltd.

Joytun Developers Ltd.

Kingdom Builders Ltd.

Kotbari Holdings Ltd.

Meghna Real Estate Ltd.

Metro Homes Ltd.

Needs Engineers & Development Ltd.

Neptune Land Development Ltd.

Oghran Technologies Ltd.

Online Development Ltd.

Rashid Engineering

Resources Developers Ltd.

GOVERNMENT AND AUTONOMOUS ORGANIZATIONS

Bangladesh Agricultural Development Corporation (BADC)

Barind Multipurpose Development Authority (BMDA)

Department of Public Health Engineering (DPHE)

Infrastructure Development Company Limited (IDCOL)



GOVERNMENT AND AUTONOMOUS ORGANIZATIONS

Dhaka Mass Rapid Transit Development Project (Metro Rail)

Bangladesh Export Processing Zone Authority (BEPZA)

(Adamjee EPZ, BEPZA Economic zone, Chattogram EPZ, Cumilla EPZ, Dhaka EPZ, Karnaphuli EPZ, Mongla EPZ & Uttara EPZ)

Bangladesh Economic Zone Authority (BEZA) (All 69 Economic Zone by govt. own)

Local Government Engineering Department (LGED)

WASA (Dhaka, Chittagong, Khulna and Rajshahi) City Corporation

(Dhaka North & South, Gazipur, Narayanganj, Chattogram, Khulna, Rajshahi, Sylhet, Rangpur and Cumilla).

DHAKA BRT PROJECT

Municipalities

Military Engineering Services (MES)

Rooppur Nuclear Power Project

Rampal Super Thermal Power Project

ZTE Corporation, China (BTCL MoTN Project)

Dhaka International Airport, Terminal 2 & 3

CITY CORPORATION

Padma Multipurpose Bridge Project

Water Development Board

Matarbari Coal-Fired Power Plant

Patuakhali 1320 MW Power plant

Payra Sea Port Authority

Chittagong Port Authority

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