



Flowguard™ cPVC Pipes

FOR HOT & COLD WATER PLUMBING SYSTEM



Only products bearing the NSF mark are certified



التوزيع من قبل شركة المؤسسة الوطنية للتسويق المحدودة

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●●● Introduction

Introduction

In order to attain the highest standard quality for pipe, NEPROPLAST associated itself with (Lubrizon™) the world pronounced leader of raw materials manufacturer in USA and Europe to produce licensed FlowGuard™ pipes. NEPROPLAST products are maintained throughout the operation by a Quality Assurance System based on ISO 9001:2015 covering both the raw materials and finished products which guarantee, the right materials for Hot and Cold water installations demanding safe, tough and reliable systems.

Material

NEPROPLAST FlowGuard™ pipes are manufactured in the Kingdom of Saudi Arabia from TempRite Compound approved for Drinking Water by NSF (USA) and WRC (UK). Fully meeting or exceeding the requirements of ASTM Material and dimensional standards. Compounds are meeting the requirements of Class 23447 as defined in the specification of ASTM D1784- and designated as 4120 as approved by NSF (USA) and WRAS (UK) for drinking water.

Standards and Assessment

NEPROPLAST FlowGuard™ Schedule 80 pipes are manufactured as prescribed in ASTM F-441 indicating manufacturer name, material designation code, pipe size, schedule size with pressure rating in PSI water at 73°F (23°C) and manufacturing date. NEPROPLAST has been assessed and certified by Intertek of United Kingdom for its Quality Management System to International Quality System Standard EN ISO 9001:2015. NEPROPLAST manufactured pipes and fittings are tested, approved and listed by NSF / ANSI 61 (USA) as "Approved product for use with drinking water."

Colour & Size

NEPROPLAST FlowGuard™ pipes are offered in grey color with a light red color strip in 6 meter length, plain ended pipes. FlowGuard™ pipes are offered from size 1/2" through 8" diameter.

Marking

NEPROPLAST FlowGuard™ pipes are marked as prescribed in the ASTM standards indicating size, manufacturer name, material designation code, pressure rating in PSI for water at 73°F and manufacturing date similar to below example.



●●● Materials Data (Properties) of NEPROPLAST FlowGuard™ pipes

Table - 1 (All values at [73°F] 23°C)

Properties	Test Method as per ASTM	Unit	Values
General Properties			
Specific Gravity	D-792	g/cm ³	1.55
Water Absorption	D-570 / 24hrs	%	0.03
Cell Designation	D-1784		23447
Flame Spread E - 84			< 25
Poission's Ratio @ 73° F			0.38
Friction Co-efficient	Hazen-William	(Factor) C	150
Mechanical Properties			
Tensile Strength	D-638 / type 1	PSI	8,000
		MPA	55

Table - 1 (All values at [73°F] 23°C) (continued)

Properties	Test Method as per ASTM	Unit	Values
Modulus of Elasticity in Tension	D-638 / type 1	PSI	>360,000
		MPA	>2,500
Compressive Strength	D-695	PSI	10,100
		MPA	70
Flexural Strength	D-790 proc. B	PSI	15,100
		MPA	104
Izod Impact	D-256 / notch	Ft-Lbs / In of notch	1.5
		JM	80
Hardness (Rockwell)	D-2240	Durometer "D"	80 ± 3
	D-785	Rockwell "R"	119
Thermal Properties			
Coefficient of Thermal Linear Expansion	D-696	in/in/°F	3.4 x 10 ⁻⁵
	D-696	cm/(cm°C)	6.3 x 10 ⁻⁵
Thermal Conductivity	D-177	BTU/hr/ft ² /°F/in	0.95
	D-177	Wm/°k/m ²	0.14
Heat Deflection Temp @ 264 PSI (1.82 MPa) / 264 PSI (1.82 MPa)	D-648	°C	103
Vicat Softening Temp.	D-1525 (rate A)	°C	95
Electrical Properties			
Dielectric Strength	D-149	Votts/Mil	1250
Dielectric Constant 60 Hz @ 30°F / 30°F @ 60 Hz	D-150	60cpv.30°F / -1°C	3.70
Specific Volume Resistivity @ 73°F / 73°F @	D-257	Ohms/cm	3.4 x 10 ¹⁵
Flammability Properties			
Flammability	D-635	Resistance	Self-extinguishing
Rate of burning	D-635	s	<10
Extent of burning	D-635	mm	<15
Flammability rating	UL-94/0.062"	Rating	V-0

●●● Dimensional Specification

Table - 2 Dimension based on ASTM F 441, Schedule 80

Nominal Pipe Size	Outside Diameter		Min. Wall Thickness		Nominal Weight	Maximum Working Pressure @ 73°F	
	Inch	mm	Inch	mm		PSI	MPa
1/2"	0.840	21.3	0.147	3.73	0.337	850	5.86
3/4"	1.050	26.7	0.154	3.91	0.455	690	4.76
1"	1.315	33.4	0.179	4.55	0.670	630	4.34
1 1/4"	1.660	42.2	0.191	4.85	0.927	520	3.59
1 1/2"	1.900	48.3	0.200	5.08	1.125	470	3.24
2"	2.375	60.3	0.218	5.54	1.560	400	2.76
2 1/2"	2.875	73.0	0.276	7.01	2.373	420	2.9
3"	3.500	88.9	0.300	7.62	3.178	370	2.55
4"	4.500	114.3	0.337	8.56	4.650	320	2.21
6"	6.625	168.3	0.432	10.97	8.872	280	1.93
8"	8.625	219.1	0.050	12.70	13.478	250	1.72

Note: In case operating temperature is above 73°F / 23°C, working pressure must be de-rated.

Table - 3 Temperature correction factor

Operating Temp.	°F	70-80	90	100	110	115	120	125	130	140	150	160	170	180	200
	°C	23-27	32	38	43	46	49	52	54	60	66	71	77	82	93
Percentage % of working pressure or de-rating factors		1.00	0.92	0.85	0.77	0.74	0.70	0.66	0.62	0.55	0.47	0.40	0.32	0.25	0.18

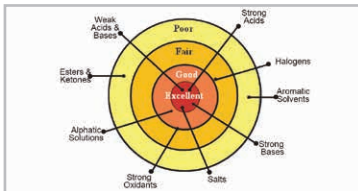
Advantages of Neproplast pipes over conventional piping materials

Corrosion and scale build up



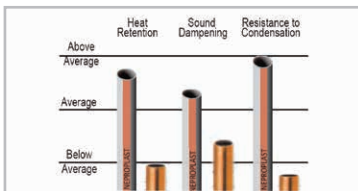
NEPROPLAST FlowGuard™ pipes are chemically resistant to nearly all acids, alkalies, alcohols, halogens as well as many other corrosive fluids. Being non-conductor of electricity, it eliminates galvanic or electrolytic corrosion which is the cause of expensive repairs. FlowGuard™ non-corroding properties ensure improved flow, lower maintenance costs and longer performance life.

Chemical resistance



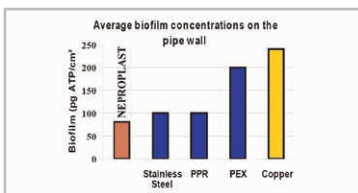
NEPROPLAST FlowGuard™ pipe inhibits excellent chemical resistance against most acids, alkalies, salt solutions and halogens. NEPROPLAST FlowGuard™ pipes are also not adversely affected by atmospheric conditions and are well suited for outdoor installations. For specific application see the NEPROPLAST chemical resistance chart.

Thermal conductivity



NEPROPLAST FlowGuard™ pipes have lower thermal conductivity than that of metal which reduces heat losses (essentially acts as an insulator) and offer better uniform fluid temperature, prevent "sweating" formation of condensation on the pipe wall. Insulation in certain instances, may be completely eliminated.

Low bacteria build up



Studies show that bacteria build up with NEPROPLAST FlowGuard™ pipes are far lower than with alternative piping materials. NEPROPLAST FlowGuard™ piping systems are resistant to fungi and bacterial growth, particularly those which cause corrosion in metal piping systems.

Reduced additive migration



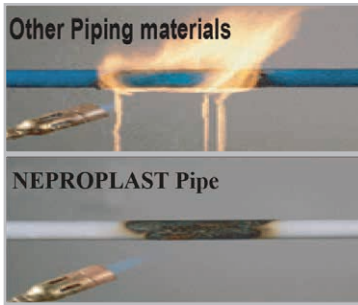
NEPROPLAST FlowGuard™ pipes do not allow the migration of additives into water supply and hence no bad odour or taste of drinking water.

Ease of handling, installation & maintenance



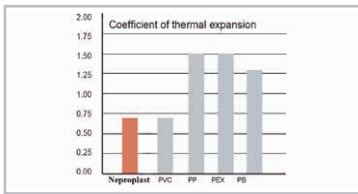
NEPROPLAST FlowGuard™ pipes are quick and easy to install and maintained with complete range of solvent cement fittings saving time, effort and money as it is light in weight and easy to handle.

Fire proof



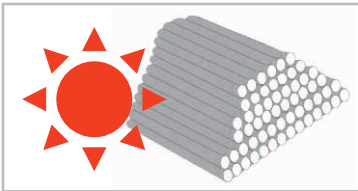
NEPROPLAST FlowGuard™ pipes do not support combustion and are self extinguishing. Pipes will not burn unless an external flame source is applied. NEPROPLAST FlowGuard™ pipes are non-toxic and will not affect taste, smell or colour of drinking water or any other liquid.

Low thermal expansion



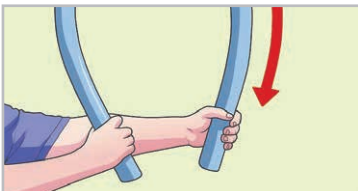
NEPROPLAST FlowGuard™ pipes have a low coefficient of thermal expansion hence it reduces the amount of pipe expanding when not water is flowing, less need for expansion loops, less "looping".

U.V. exposure



Since degradation process in NEPROPLAST FlowGuard™ pipes has been dehydrochlorination and not oxidation. The outdoor exposure of pipes to UV does not break polymer. Hence it has only been limited to surface discoloration.

Mechanical Strength



NEPROPLAST FlowGuard™ pipes are light in weight, having a specific weight which is about one fifth of steel pipes. This will reduce transportation costs and facilitate pipe installation.

Friction loss through piping

$$f = 0.2083 \times \left(\frac{100}{C}\right)^{1.852} \times \frac{Q^{1.852}}{D_j^{4.8655}}$$

f = Friction loss (ft. of H₂O / 100ft)
 Q = Flow rate (gpm)
 D_j = Pipe inside diameter (inch)
 C = Flow coefficient

NEPROPLAST FlowGuard™ pipes being mirror-smooth inner surface has lower friction loss as compared to metals i.e. lower pressure losses. The most widely used equation to calculate friction loss in pressure systems is the Hazen-Williams equation.

Type of Pipe	Vinyl	Copper	Cast iron - unlined	Galvanized steel	Corrugated steel pipe
Flow coefficient "C"	150	140	90-420	110	60

●●● Solvent Welding of NEPROPLAST pipes & fittings

The method of joining is very simple and reliable if it is followed correctly, but any deviations from the recommended basic steps may reduce the strength and integrity of the joint. The procedures for preparation, insertion and curing should be followed very carefully. For further details please consult the manufacturer or its representative.

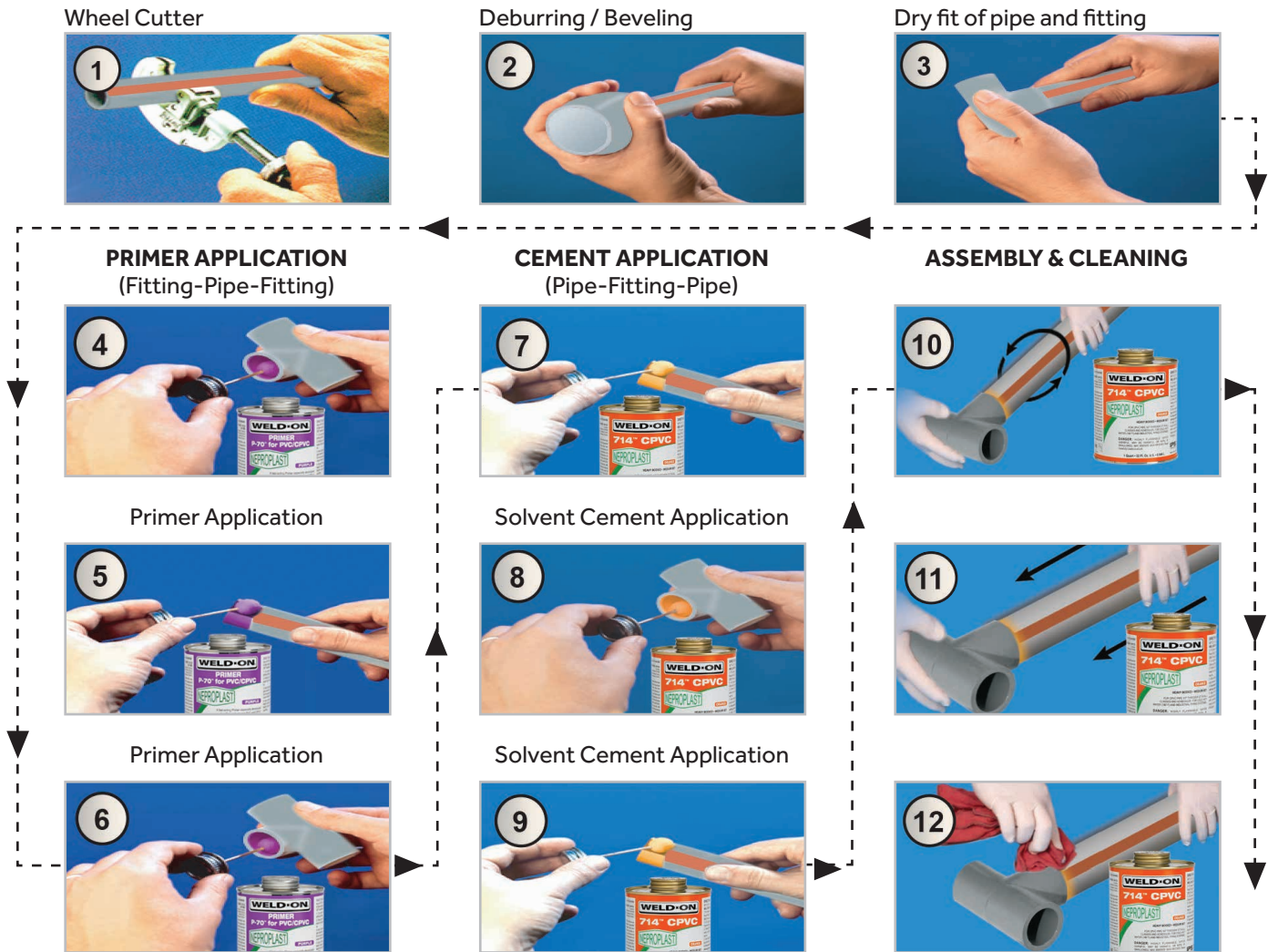


Table - 4 Recommended joint curing time chart (the necessary time to allow before pressurizing system)

Relative Humidity 60% or Less	Test Pressure for pipe size 1/2" to 1 1/4"		Test Pressure for pipe size 1 1/2" to 3"		Test Pressure for pipe size 4" to 8"	
	upto 180 PSI	above 180 to 370 PSI	upto 180 PSI	above 180 to 315 PSI	upto 180 PSI	above 180 to 315 PSI
Temperature range during assembly and cure periods						
60° - 100° F	06 h.r.s	06 h.r.s	02 h.r.s	12 h.r.s	06 h.r.s	24 h.r.s
40° - 60° F	02 h.r.s	12 h.r.s	04 h.r.s	24 h.r.s	12 h.r.s	48 h.r.s
0° - 40° F	08 h.r.s	48 h.r.s	16 h.r.s	96 h.r.s	18 h.r.s	08 h.r.s

Note: All above figures are estimates & approximate

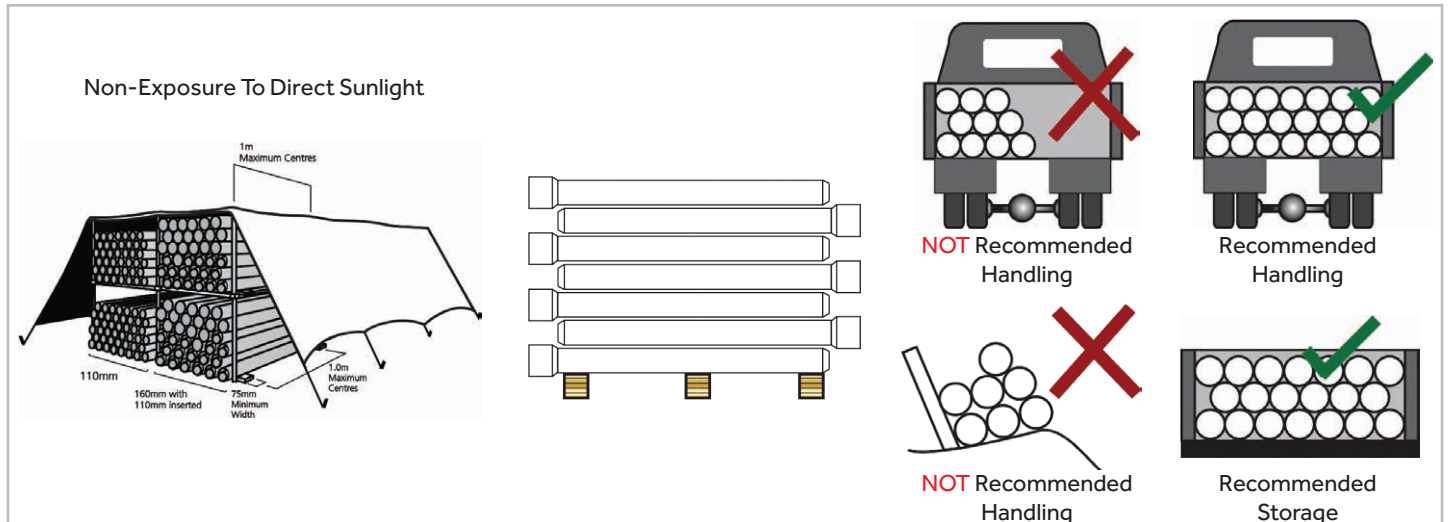
Table - 5 Average number of joints / quart (1 kg) of cement

Pipe Diameter	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"
No. of Joints	300	200	125	90	90	40	30	10	5

General Manufacturer Recommendation / Guidelines

Handling and Storage

Compared to steel, iron or copper pipe, NEPROPLAST FlowGuard™ pipes and fittings have lower impact resistance (especially at low temperatures). Care should be exercised during transportation, storage and installation. NEPROPLAST FlowGuard™ pipes installed in high impact areas should be protected accordingly. Ideally, piping must not be buried less than 1M in areas of heavy vehicles or construction equipment traffic. Fatigue of the pipe and joints will occur unless they are encased in a suitable metal conduit casing.



Temperature / Pressure

The working pressure of NEPROPLAST FlowGuard™ pipes and fittings varies with changes in temperature. Before placing a piping system the maximum working pressure should be verified. See (Table 3)

Hanging and Supporting

The modulus of elasticity of NEPROPLAST FlowGuard™ pipes is smaller than for metal pipes. Maximum working temperature and room temperature should be considered when determining the required support spacing.

Trench Preparation

When laying NEPROPLAST FlowGuard™ pipes below the ground, care should be taken to remove all rocks, boards, empty primer and cement cans, brushes, bottles and other debris from the trench. The smaller diameter of the pipe should be "snaked" in the trench to allow for expansion and contraction. Since solvent cement welding is used for the method of joining. Snaking, pressure testing and pipe movement should not be done until after the joints have been given sufficient time to dry.

Table - 6 Recommended Maximum Support Spacing in feet of NEPROPLAST FlowGuard™ pipes

Pipe Size (in)	Schedule						
	73°F (23°C)	100°F (38°C)	120°F (49°C)	140°F (60°C)	160°F (71°C)	180°F (82°C)	200°F (92°C)
1/2"	3.1	3.0	2.9	2.8	2.7	2.7	2.5
3/4"	3.5	3.4	3.3	3.2	3.1	3.0	2.8
1"	4.1	3.9	3.8	3.7	3.6	3.5	3.3
1 1/4"	4.6	4.5	4.4	4.2	4.1	4.0	3.7
1 1/2"	5.0	4.8	4.7	4.6	4.4	4.3	4.0
2"	5.6	5.5	5.3	5.2	5.0	4.9	4.5
2 1/2"	6.5	6.3	6.1	5.9	5.7	5.6	5.2
3"	7.2	7.0	6.8	6.6	6.4	6.2	5.8
4"	8.3	8.1	7.8	7.6	7.4	7.1	6.7
6"	10.4	10.1	9.8	9.5	9.2	9.0	8.4
8"	12.1	11.7	11.4	11.0	10.7	10.4	9.7

Non-Liquid Transport

NEPROPLAST do not recommend its pipes and fittings for use in air or compressed gas systems. NEPROPLAST FlowGuard™ pipes and fittings are excellent products for the transport of water and corrosive chemicals but there are a number of other piping products that are specially designed and suitable for compressed air and gases.

Testing

Air or gas for pressure testing of NEPROPLAST FlowGuard™ piping systems is not permitted.

Hydrostatic Pressure Testing Procedure

The assembled joints should be fully cured before filling the system with water.

All valves and air relief mechanics should be opened at the ends and at elevations. The system should be filled slowly with flow velocities which do not exceed 1 foot per second. This will prevent surges, water hammers with air entrapments.

Water flow should continue until all entrapped air is completely flushed out at every branch of the system. Maintain the 1 ft/s

velocity until every valve is checked. A rapidly fluctuating gauge needle during the increase of pressure rise may be an indication that entrapped air still remains in the system. The system should include the appropriate air relief vacuum breaker valves to vent air during normal operation after installation. Trapped air is a major cause of the surge and burst failure in plastic piping systems.

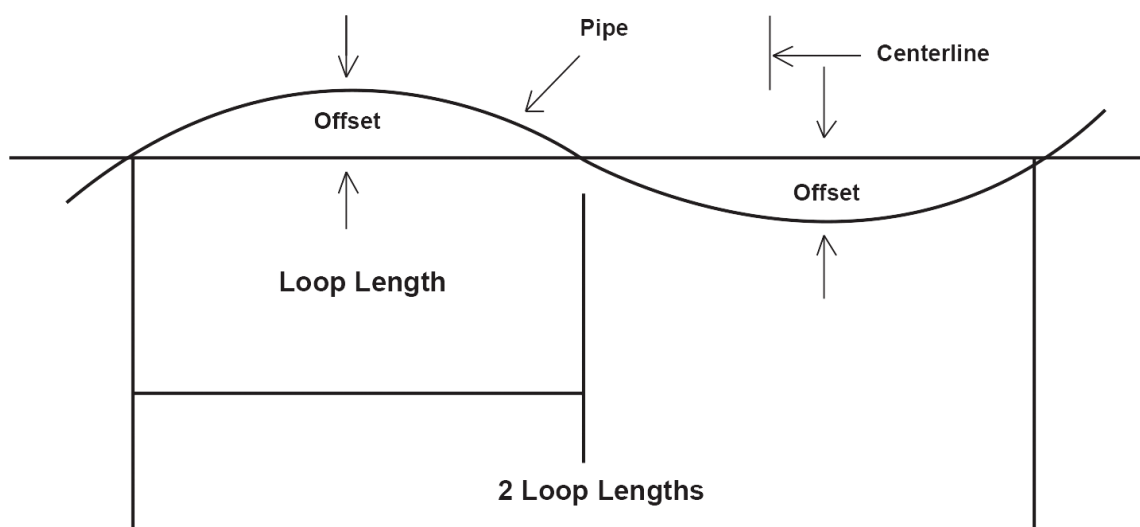
Following filling of the system, do not pressurize until the responsible Engineer is present to witness the test. Everyone in the vicinity of the system should wear safety glasses and hard hats. High voltage electrical equipment should be shielded from a possible spray.

The piping system should be pressurized to 120% of its maximum design operating pressure. This pressure must not exceed the working pressure of the lowest rated component in the system i.e Flanges, Unions, Threaded parts, Valves, etc.

The pressure tests should not exceed 24.0 hours. This should provide enough time to inspect all joints for leak repair. The system should be then recharged and retested.

Pipe Snaking

After the NEPROPLAST FlowGuard™ pipe has been solvent welded. It is advisable to snake the pipe beside the trench according to the following recommendation. **BE ESPECIALLY CAREFUL NOT TO APPLY ANY STRESS THAT WILL DISTURB THE UNDRYED JOINT.** This snaking is necessary in order to allow for any anticipated thermal contraction that will take place in the newly joined pipeline.



PIPE SNAKING

●●● Applications of NEPROPLAST cPVC pipes



Water Supplies

Nontoxic NEPROPLAST cPVC pipes will not affect the taste, color or smell of drinking water. They will never corrode and are therefore extremely sanitary. Deposits and scales will not build up inside as in the case of conventional steel pipes. Their strength is greater than that of asbestos pipe. NEPROPLAST obtained SASO certification and NSF 61 for drinking water use.



Irrigation Systems

NEPROPLAST cPVC pipes are ideal for agricultural irrigation and sprinkler systems. Non-corrosive NEPROPLAST cPVC pipes are perfect for carrying water which contains chemical fertilizers and insect inhibitor. In thick wall and large diameter NEPROPLAST cPVC pipes liquids can be transported under high pressure, which is convenient for the management of large volumes.



Industry

Resistant to most chemicals, NEPROPLAST cPVC pipes have an important role to play in industrial plants. Light, non-corrosive and easy to assemble, they allow more complex piping work than with steel or cast-iron pipes.



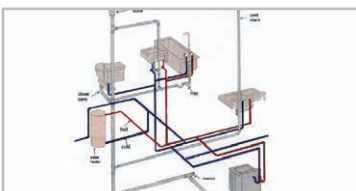
Soil, Waste & Drainage Sewer System

Waste lines for corrosive gases, ventilation for office buildings and factories, drainage systems for private homes and elevated highways these are a few of the many possibilities for NEPROPLAST cPVC pipes. A full line of cPVC fittings is available to ensure easy installation.



Mining

NEPROPLAST cPVC pipes particularly are well suited for draining corrosive liquids found in mines. They make an ideal vent line for pits because they are easily installed in hard to reach places.



Plumbing and Air Conditioning

NEPROPLAST Rigid FlowGuard™ cPVC pipes licensed by Lubrizol (Raw Materials Producer) are the most popular and widely used type of plumbing plastic pipes for hot and cold water supply lines. NEPROPLAST FlowGuard™ pipes are also utilized in water Air Conditioning at 5° (degree).



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