Cosmoplast™

CPVC HIGH PRESSURE PIPES AND FITTINGS

NSF®

WRAS®
Water Regulations Advisory Scheme

Cosmoplast

Cosmoplast, a primary member of Group Harwal, has been at the forefront of the plastic industry in the Gulf region since it's founding in 1976. Through constant growth and product diversification, the company continues to be the largest thermoplastic pipe manufacturer in the region.

Continuously enhancing its capabilities in plastic manufacturing technologies, Cosmoplast now utilizes a diverse range of materials such as CPVC, polyethylene (PE100, PE80, LLDPE), cross linked polyethylene (PEX), random copolymer polypropylene (PP-R), and glass-reinforced plastic (GRP).

Cosmoplast's ongoing research and development programs continue to add new products to its pipeline systems product range that now includes pre-insulated pipes, reinforced thermoplastic pipes, specialized plumbing systems and fabricated CPVC and GRP manhole systems. It's state of the art engineering, design and tool room facilities are fully capable of manufacturing moulds, dies, machinery equipments and other specialized tooling requirements to meet the company's continual expansion and product development requirements.

With this extended product range, Cosmoplast's pipeline systems cater to an extensive range of market sectors and applications covering infrastructure development, plumbing, oil & gas, district cooling, irrigation, landscaping and water extraction.

An ISO 9001 certified company, Cosmoplast has its production facilities based in Sharjah, Abu Dhabi and Dubai converting over 75,000 metric tons of plastic per annum. In addition to these, Cosmoplast also has upcoming facilities in Saudi Arabia, Moscow and Kaliningrad.

COSMOPLAST PIPELINE SYSTEMS PRODUCT RANGE INCLUDES:

INFRASTRUCTURE PIPELINE SYSTEMS (CPVC, PE, GRP)

CPVC and Polyethylene pipeline systems with sizes ranging from 15mm up to 1200mm, well casings and screens and GRP pipeline systems with sizes from 100mm up to 1400mm for applications including

- Water extraction
- Water distribution
- Drainage
- Sewerage
- Gas distribution
- Cable ducting

PLUMBING SYSTEMS (CPVC, PP-R, PEX)

Comprehensive range includes CPVC systems for drainage, random polypropylene (PP-R) [plain and aluminium composite] and cross linked polyethylene (PEX) systems for water and sanitary applications and CPVC high pressure pipes and fittings for water supply and A/C drain. Plumbing accessories such as pipe clamps, polyethylene compression fittings, solvent cements, lubricants and adhesives compliment this product range.

PRE-INSULATED PIPES (HDPE-HDPE, HDPE-GRP, HDPE-STEEL, GRP-HDPE, GRP-GRP, GRP-STEEL)

Jacket – core pipe combination with polyurethane insulation are used for applications such as District Cooling systems, Oil & Gas and other industrial applications. Cosmoplast provides HDPE and GRP pipes as jackets and HDPE, GRP and steel as core pipes.

IRRIGATION SYSTEMS (LLDPE)

Consists of high precision inline drip pipes and landscape and lawn edging. This range also includes saline resistant valves, drainage systems, sprinklers and central controllers.

REINFORCED THERMOPLASTIC PIPES (RTP)

Available in length of upto 500m, with a working pressure of 150 Bar at a temperature of 60 degrees celsius. RTP is used for gas distribution networks, oil flow lines and water injection lines.

ISO 4427/4437
BSEN 1329 / 1401 / BS 5255
BSEN 1452-2 / EN1519

NSF

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Intertek

UKAS
MANAGEMENT SYSTEMS

Cosmoplast CPVC PIPES & FITTINGS FOR PRESSURE SYSTEMS

CPVC material is chlorinated polyvinyl chloride which is a specialty PVC compound characterized by unique thermal, physical and mechanical properties desirable for piping applications like improved impact resistance and good fire resistance capabilities.

Principal uses for CPVC are domestic hot water and cold water piping, residential fire-sprinkling piping, and many industrial applications which can take advantage of its elevated-temperature capabilities and superior chemical resistance.

Cosmoplast CPVC high pressure pipes and fittings satisfy the increasing demand for American and European standard CPVC pipes and fittings for plumbing applications, pertaining to hot and cold water distribution systems that demand high levels of toughness, chemical and thermal resistance.

FIELDS OF APPLICATIONS

Cosmoplast High Pressure CPVC pipes and fittings are widely used in

- Hot and cold water distribution in residential, industrial and public buildings.
- Transportation of hot water in Heating Systems.
- Piping networks for sprinkler fire fighting systems.
- Solar heating, central heating and radiant floor heating application Air Conditioning Drain Systems.
- Piping networks for swimming pools facilities.
- Piping networks for rainwater utilization.
- Irrigation networks.
- Circulation of hot and cold fluids in industrial applications.
- Transport of wide range of chemicals and corrosive fluids in industrial applications.

FEATURES OF CPVC PIPING SYSTEMS

Resistance to High Temperature

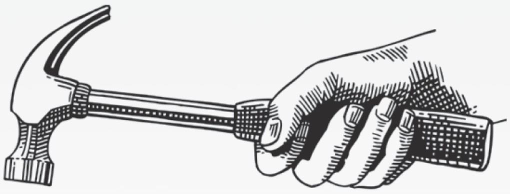
CPVC pipes and fittings are able to withstand high temperature in excess of 93°C.

Chemical Resistance

CPVC pressure pipes and fittings are highly resistant to wide range of strong acids, alkalis, salt solutions, alcohols, and many other chemicals. This property makes CPVC pressure pipes and fittings preferred in corrosive applications and gives no tastes or odors to materials carried in them. They do not react with materials carried, nor act as a catalyst. It can even be buried directly under concrete slabs with no chemical interaction with concrete.

High Strength

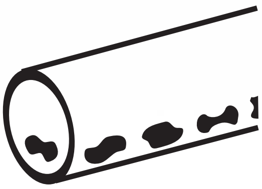
Cosmoplast CPVC Pressure pipes and fittings are highly resilient, tough and durable products with high-tensile and high-impact strength. All these features guarantee higher pressure resistance capacity. CPVC pipes require less hangers and supports compared to other systems.



Corrosion Resistance

Cosmoplast High Pressure CPVC system is a high corrosion resistant, with superior ability to stand low pH levels water, coastal salt air exposure and corrosive soil.
It also offers a major reduction in oxidation, which consequently guarantees the long durability of the system.

CPVC Pressure pipes and fittings are highly resistant to industrial fumes, humidity, salt water, weather and underground conditions. Scratches or surface abrasions do not provide points which corrosive elements can attack.



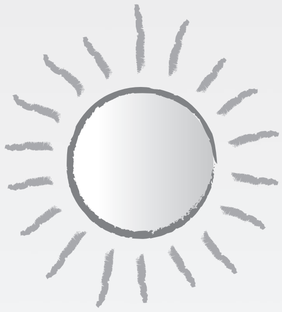
Resistance to Galvanic or Electrolytic Attack

CPVC Pressure pipes and fittings are resistant to galvanic and electrolytic attack. They can be used underground, underwater, and can be safely connected to metal parts.

Resistance to Ultraviolet Exposure

Certain onsite temperatures are higher in the Gulf region, and Cosmoplast High Pressure CPVC system can easily withstand the ultraviolet exposure commonly experienced during the construction phase of the projects, provided the onsite inventories are appropriately stored.

Although CPVC pipe can be installed in direct sunlight, it will be affected by ultra-violet light which tends to discolor the pipe and can cause a loss of impact strength. No other properties are impaired. If the pipe is to be installed in continuous direct sunlight, it is advisable to paint the exterior installations with two coats of white or light color water base latex paint for additional protection.



Low Thermal Conductivity

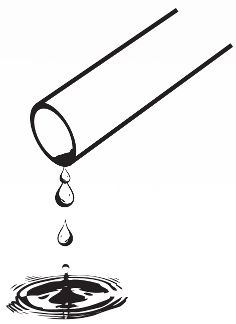
CPVC Pressure pipes and fittings have a lower thermal conductivity compared to metal pipes. This ensures that fluids maintain a more constant temperature and therefore they require less insulation than metal pipes. In most cases, pipe insulation is not required.

Low Thermal Expansion

Laboratory testing and installation experience have demonstrated that the potential expansion problems in CPVC are much smaller than those which the coefficient of thermal expansion might suggest. The stresses developed within the CPVC pipes are generally much lower than those developed in equivalent metal pipes for equal temperature changes due to their elastic nature.

Low Condensation

Due to CPVC's polymeric structure, costly condensation and damp concerns are eliminated, in addition to a considerable reduction in most of the long-term problems that would be experienced with metal installation.



Noise Reduction

Cosmoplast High Pressure CPVC system is a quiet system, and therefore when used for water distribution in residential contexts, an additional advantage is derived. The low noise performance is due to the polymeric structure of the CPVC material, so the noise associated with water hammer is eliminated.

Suitable for Carrying Drinking Water

Cosmoplast CPVC pipes and fittings are retardant to bacterial growth which guarantees the quality and purity of water. They are suitable for aggressive low water pH levels of less than 6.5.

Easy Handling and Installation

CPVC pressure pipe and fittings are lightweight (approximately one sixth the weight of steel) which results in reducing the transportation, handling, and installation costs.
The installation is very easy and simple using CPVC solvent cement. Simple cutter, chamfering tool and CPVC solvent are the only requirements for leak proof jointing.

Low Friction Loss

CPVC Pressure pipes and fittings have low coefficient of friction due to its smooth internal surfaces which results in low friction loss and high flow rate.

Therefore they will not fail prematurely due to corrosion or scale build-up, especially in areas where water, soil, and/or atmospheric conditions are aggressive in nature like the Gulf Region.

CPVC pipes guarantee full water carrying capacity because of lack of scale buildup, pitting and leaching which results in smooth and full bore flow and low water noise.

CPVC AND PVC MATERIALS

CPVC is a chemical modification of PVC material; both materials are very similar in many properties, including strength and stiffness at ambient temperature.

The extra chlorine in CPVC's chemical structure increases the material's maximum operating temperature limit by about 28°C above that for PVC. Therefore CPVC can be used up to nearly 93°C for pressure uses and up to about 100°C for non-pressure applications.

PVC has a crystalline structure that enables it to be made into flexible material, while CPVC has a more rigid chain due to the additional chlorine atoms attached to the PVC chain and thus is a more brittle material.

This special chemical structure of CPVC allows it to have a higher temperature resistance compared to PVC. CPVC can withstand temperature in excess of 93°C (for short time loading up to 100°C) while PVC can withstand temperature up to 60°C.

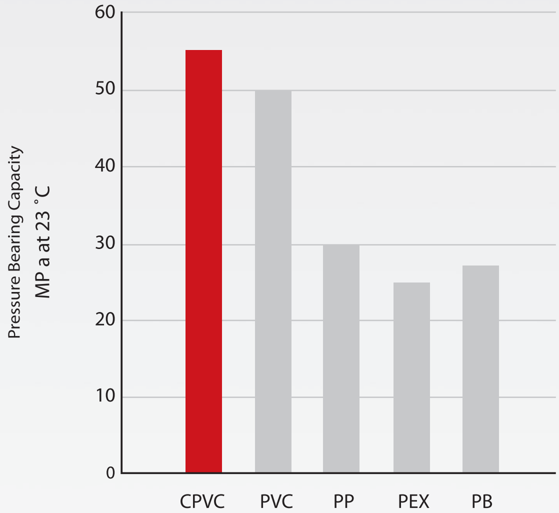
The two materials have almost the same chemical resistance.

CPVC Material Strength

CPVC enjoys a much higher strength than other common thermoplastic materials used in plumbing systems.

Due to this feature, CPVC needs fewer hangers and supports than other common materials and eliminates the curvatures in pipe lines experienced in other systems.

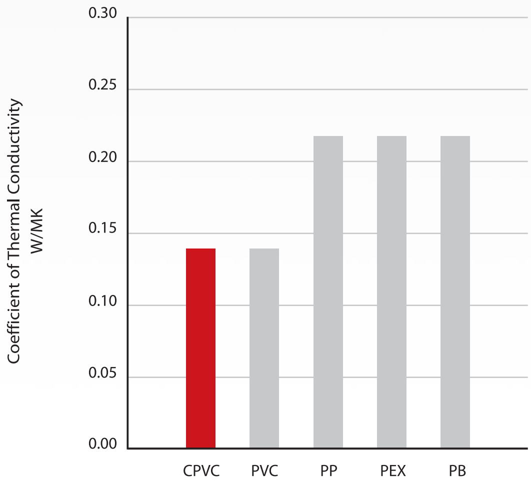
This feature also makes CPVC ideal for vertical installations (risers) and increases its pressure bearing capacity.



CPVC Thermal Conductivity

The thermal conductivity of CPVC material is lower than most of the common thermoplastics used in plumbing systems. This feature reduces the heat loss / gain of the fluids being transported in CPVC pipes.

This leads to a higher energy saving and reduces the amount of thermal insulation needed for CPVC pipes.



Fire Resistance

CPVC material exhibits outstanding fire performance characteristics in terms of limited flame propagation and low smoke generation. When combined with its excellent mechanical strength, low thermal conductivity, and outstanding corrosion resistance, CPVC provides excellent value in terms of safety and performance in a wide range of applications.

CPVC material has integral flame retarding property with very high Limiting Oxygen Index (LOI) of 60. This feature guarantees that CPVC pipes cannot be the ignition source of fire or support or sustain combustion. It does not increase fire load, has low smoke generation and low flame spread without flaming drips.

Ignition Resistance

CPVC has a flash ignition temperature of 482°C while many other ordinary combustibles, such as wood, ignite at 260°C or less.

The following table shows the ignition temperature of some combustible materials:

Material	Ignition Temperature (°C)
CPVC	482
PVC	399
Polyethylene	343
Paper	232

Burning Resistance

CPVC material will not sustain burning unless it is forced to burn, this is a result of its very high Limiting Oxygen Index (LOI) of 60 (the percentage of oxygen needed in an atmosphere to support combustion).

As Earth's atmosphere is only 21% oxygen, CPVC will not burn unless continuously subjected to flame, it will stop burning when the ignition source is removed. Other combustible materials will support combustion due to their low LOI.

Material	LOI
CPVC	60
PVC	45
PVDF	44
ABS	18
Polypropylene	17
Polyethylene	17

WORKING CONDITIONS OF CPVC PIPING SYSTEMS

Working Temperature

Cosmoplast CPVC pipes and fittings are recommended for applications where the operating temperature reaches up to 93°C (for short time loading up to 100°C).

There is theoretically no lower temperature limit on CPVC. However at very cold temperatures the material becomes brittle and the impact strength declines.

Working Pressure

The working pressure of CPVC pipes is directly related to the standard of production and schedule of pipe.

The tables on page 14 and 15 show the dimensions and pressure ratings of CPVC pipes.

CPVC MATERIAL PROPERTIES

The CPVC typical material properties are listed in the following table. Slight variation could exist depending on the material compounds.

GENERAL	Value	Test Method
Cell Classification	23447	ASTM D1784
Maximum Service Temp.	194 deg F	-
	90 deg C	-
Specific Gravity, (g/cm^3@ 73°F)	1.50 +/- 0.03	ASTM D792
Water Absorption % increase 24 hrs @ 25°C	0.03	ASTM D570
Hardness, Rock well	117	ASTM D785
MECHANICAL		
Tensile Strength, psi @ 73°F (22°C)	7,750 PSI / 50 MPa	ASTM D638
Tensile Modulus of Elasticity, psi @ 73°F (22°C)	360,000 / 2480 MPa	ASTM D638
Flexural Strength, psi @ 73°F (22°C)	13,000 / 90 MPa	ASTM D790
Flexural Modulus, psi @ 73°F (22°C)	360,000 / 2480 MPa	ASTM D790
Compressive Strength, psi @ 73°F (22°C)	10,000 / 68 MPa	ASTM D695
Compressive Modulus, psi @ 73°F (22°C)	196,000 / 1350 MPa	ASTM D695
Izod Impact, notched, ft lb/in @ 73°F (22°C)	1.5 ft lb / in ; 80.1 J/m	ASTM D256
THERMAL		
Coefficient of Linear Expansion (in/in/°F)	3.4 x 10 (-5)	ASTM D696
Coefficient of Thermal Conductivity (Cal.)(cm)/(cm^2)(Sec.)(°C) BTU/in/hr/ft.2/°F Watt/m/°K	 3.27×10^{-4} 0.95 0.137	ASTM C177
Heat Deflection Temperature Under Load (264psi, Annealed)	226°F (107°C)	ASTM D648
ELECTRICAL		
Dielectric Strength, volts/mil	1,250	ASTM D149
Dielectric Constant, 60Hz, 30°F	3.7	ASTM D150
Volume Resistivity, ohm/cm @ 73°F (22°C)	3.4×10^{15}	ASTM D257

FIRE PERFORMANCE		
Flammability Rating	V-0, 5VB, 5VA	UL-94
Flame Spread Index	<10	
Flame Spread	<25	ASTM E -84/UL 723
	<25	ULC
Smoke Generation	≤50	ASTM E -84/UL 723
	<50	ULC
Flash Ignition Temp.	900°F	
Average Time of Burning (sec.)	<5	ASTM D635
Average Extent of Burning (mm)	<10	
Burning Rate (in/min)	Self Extinguishing	
Softening Starts (approx.)	295°F (146°C)	
Material Becomes Viscous	395°F (201°C)	
Material Carbonizes	450°F (232°C)	
Limiting Oxygen Index (LOI)	60	ASTM D2863

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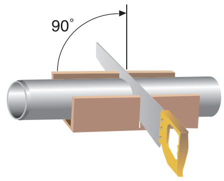
JOINTING

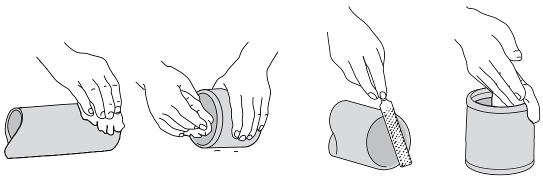
CPVC pressure pipes and fittings are jointed using solvent welding process which involves using heavy duty solvent cement.

Solvent Cement Jointing Procedure



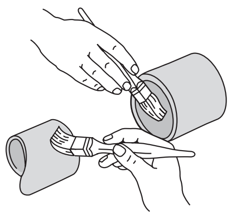
1 Cut the pipe at right angle to the pipe axis using suitable sharp pipe cutter. The pipe may be cut quickly and efficiently by Wheel-type plastic tubing cutter or Ratchet type cutters or fine tooth saws.

2 Remove burrs and filings from the outside and inside of the tube.

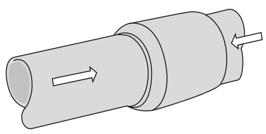


3 Clean the pipe and the fitting with dry cloth, in order to avoid any dust or sand that might affect the quality of the joint. Clean the spigot and socket area with a dry cloth (natural fibers) to remove all dirt and moisture from spigot and socket.

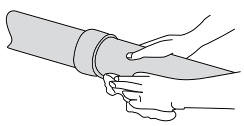
4 Apply cleaner solution to the outside surface of the pipe and to the inside surface of the fitting. Cleaner will prepare the surface for jointing for a better quality joint.



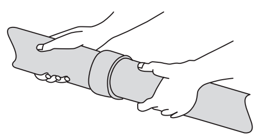
5 Using a suitably sized brush, apply a thin even coat of solvent cement to the internal surface of the fitting socket first then to the pipe spigot. Excess solvent cement must be avoided as pools of solvent cement will continue to attack the CPVC and weaken the pipe. Excess solvent cement will accumulate inside the system and may cause a reduction in the joint cross section.



6 While both surfaces are still wet with solvent cement, insert the pipe into the fitting in a single movement. Do not stop halfway, since the bond will start to set immediately and it will be almost impossible to insert further. For a better distribution of the solvent cement, twist the pipe a 1/4 turn during insertion into the socket.



7 Wipe any excess cement from the pipe and leave the joint to dry completely.



8 Hold the joint for around 30 seconds, during which avoid applying any load on the joint in order to avoid reducing the strength of the joint.

9 Leave the system for at least 12 hours before filling with water.

10 At temperatures of 16°C and above, leave the system for 24 hours before pressure testing. At lower temperatures, 48 hours is necessary before pressure testing.

RECOMMENDATIONS TO ACHIEVE AN EFFECTIVE JOINT

Make sure that the end of each pipe is square in its socket and in the same alignment and grade as the preceding pipes or fittings.

Create a 0.5mm chamfer, as a sharp edge on the spigot will wipe off the solvent and reduce the interface area.

Do not attempt to joint pipes at an angle. Curved lines should be jointed without stress, then curved after the joint is cured.

Previously cemented spigots and sockets be re-used. To repair a joint, cut out the defected joint and make a new joint.

Do not spill solvent cement onto pipes or fittings. Accidental spillage should be wiped off immediately.

Safety

Ensure good ventilation in the working areas. Forced ventilation should be used in confined spaces.

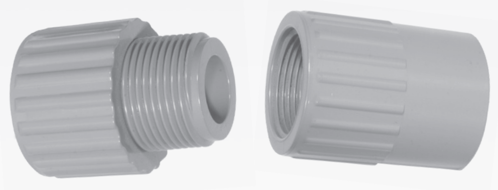
Do not bring a naked flame close to the solvent cement operations.

Spillage of solvent cement on the skin should be washed off immediately with soap and water.

Should the solvent cement get in the eyes, wash them with clean water for at least 15 minutes and seek medical advice.

THREADED JOINTS

Cutting of threads on CPVC pipes is not an acceptable practice. Instead, moulded threaded adaptors should be used.



RECOMMENDATIONS FOR THREADED JOINTS

1 For threaded fittings, use Teflon thread-wrap tape in order to guarantee the water- tightness.

2 Grease or solvent cement should never be used on the threads.

3 Test the threaded parts before final assembly to ensure thread matching, particularly when connecting to other materials or to other manufacturers' fittings. The amount of Teflon tape should be Judged accordingly.

4 The threaded joints should be tightened initially by hand, and then a further two more turns should be sufficient to create a seal.

Note. Over tightening will over stress the fitting and could cause cracks and leakage.

5 When making a transition connection to metal threads, use male threaded adapter whenever possible. This is necessary to avoid cracking the female CPVC fitting due to over tightening in presence of extra Teflon tape.

BRASS THREADED FITTINGS

Cosmoplast presents an innovative range of CPVC fittings with brass threads which are recommended for jointing CPVC pipework to metal pipe work. These fittings present an additional security when assembling metallic valves, angle valves, bib taps,..etc where an additional over-tightening is expected by the installers.

PIPE SUPPORTS

When CPVC pipes are installed above-ground, they must be supported properly to avoid vibrations and stresses.

Brackets and Clips

Pipe supports and brackets should provide continuous support for at least 120° of the pipe circumference.

Sliding Joints

Sliding joints allow the pipe to move without restraint along its axis while still being supported. Pipe clamps with rubber lining should be used to prevent the support from scratching or damaging the pipe during expansion and contraction.

Fixed Joints

A fixed support rigidly connects the pipeline to a structure totally restricting movement in at least two planes of direction. Such a support can be used to absorb moments and thrusts.

Placement of Supports

The places of pipe clamps should be selected considering that thermal and other movements do not result in significant bending movements at rigid connections or at bends or tees.

Support Distances

Pipe clamps and hangers should be installed in proper distances as indicated in the following table:

Support Distances for Sch80 CPVC pipes						
Nominal Size(inch)	Temperature (°C)					
	15	26	37	49	60	82
¼	172	172	156	141	141	78
½	172	172	172	156	141	78
¾	188	188	188	172	156	94
1	203	203	188	188	172	94
1¼	219	219	203	188	172	109
1½	219	219	219	203	188	109
2	250	234	234	234	203	125
3	250	250	250	234	219	125
4	281	281	281	266	234	141
6	313	328	297	281	250	156
8	344	344	328	313	281	172

- For Sch80 CPVC pipes.
- Distances in cm.
- The date in this table should be used as a general recommendation only and not as a guarantee of performance.

TESTING AND COMMISSIONING

The pipeline may be tested as a whole or in sections, depending on the diameter and length of the pipe and the spacing between sections.

Before performing pressure testing, all supports must be finished and the concrete properly cured (the minimum time is seven days).

Special care should be taken while filling the system with water to ensure removing air from the system before pressurizing the system.

CPVC pipelines are usually tested at 1.5 times the working pressure.

After reaching the test pressure, the drop in pressure must be noted over time. Slight pressure drop normally occurs as the remaining air goes into solution, and due to some further expansion of the pipe.

Re-pressurize the system to the testing pressure and again note the drop in pressure over the same time period.

Constant pressure (or very small drop) indicates a satisfactory result, while bigger pressure drop may indicate a leak.

It is recommended that the test pressure should be held for a minimum period of 15 minutes.

The test pressure should never exceed 1.5 times the pipe pressure rating.

After completing the pressure test, the pipeline should be thoroughly flushed and dosed with a sterilizing agent such as chlorine. Local authority requirements should be followed.

HANDLING, STORAGE AND TRANSPORTATION

CPVC pipes can be damaged by rough handling. Transportation, storage and handling should be done taking into consideration the below directions and precautions.

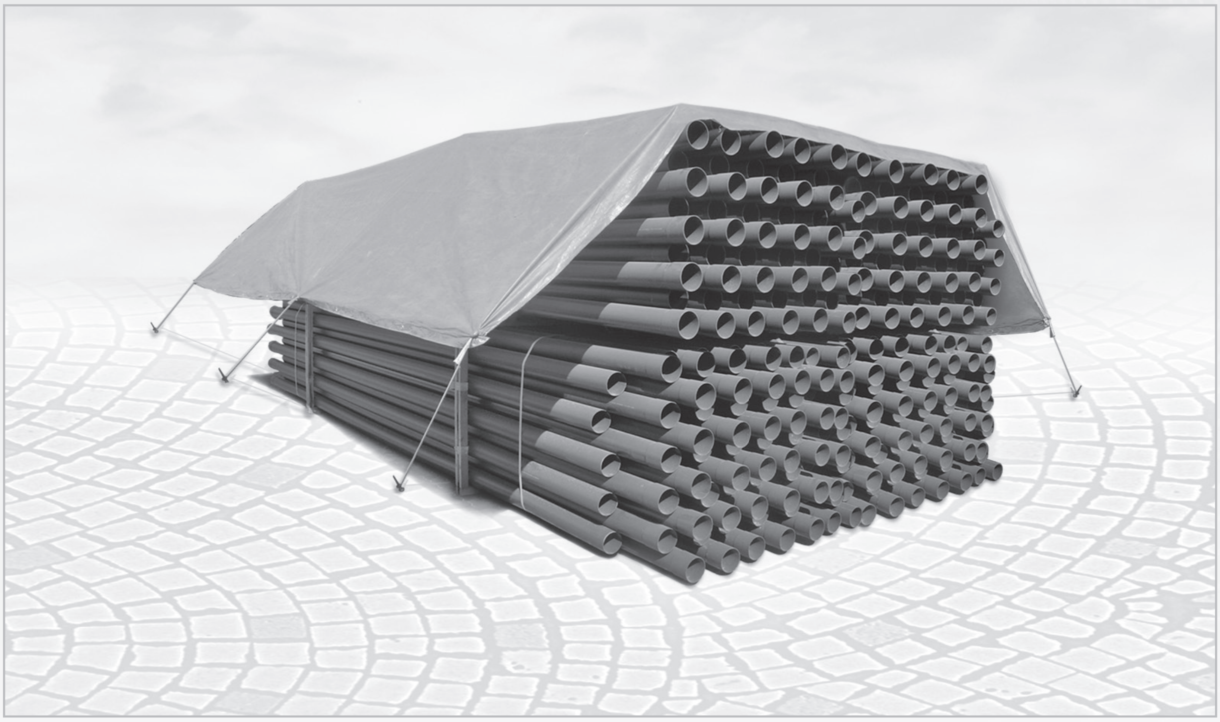
Handling

- Take all reasonable care when handling CPVC, particularly in very cold conditions when the impact strength of the material is reduced.
- Do not throw or drop pipes, or drag them along hard surfaces.
- Do not scratch pipes against hard surfaces or drag them along the ground.
- In case of mechanical handling, use protective slings and padded supports. Metal chains and hooks should not make direct contact with the pipes.

Storage

- To avoid deformation over time, pipes should be stacked:
  » either on a flat base
  » or on a level ground
  » or on 75mm x 75mm timber at 1m max. centers.
- For long-term storage (longer than 3 months) the maximum free height should not exceed 1.5m. The heaviest pipes should be on the bottom.
- Provide side support with 75mm wide battens at 1m centers.
- Vertical side supports should also be provided at intervals of 3m along rectangular pipe stacks.
- Maximum stack height is 1.7 meters regardless the pipe diameter.
- Store all materials in well-ventilated, shady conditions.
- Avoid direct exposure to sunlight for long periods.
- If stored in the open for long periods or exposed to strong sunlight, cover the stack with heavy sheets. Coverings such as black plastic must not be used as these can greatly increase the temperatures within the stack.
- Keep fittings in original packaging until required for use.
- Store fittings under cover. Do not remove from cartons or packaging until required.

- Ideally, stacks should contain one diameter pipe size only. Where this is not possible, stack largest diameter pipes at base of stack. Small pipes may be nested inside larger pipes.
- Do not place heavy items on top of the pipes.
- Protect the pipes from dirt, gravel or mud, as this could damage the ring seals inside the sockets.
- Pipes should be kept clean as much as possible, as this may save cleaning time while preparing pipes for welding.



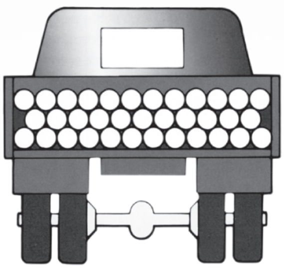
Transportation

While in transit pipes should be well secured and supported. Chains or wire ropes may be used only if suitably padded to protect the pipe from damage.

Pipes should be arranged safely on trucks avoiding crossing, bending and over stacking. Care should be taken that the pipes are firmly tied so that the sockets cannot rub together.

Pipes may be unloaded from vehicles by rolling them gently down timbers, care being taken to ensure that the pipes do not fall onto one another or onto any hard or uneven surface.

The pipes should also be fully supported over their total length.



STANDARDS

Cosmoplast CPVC pipes and fittings are manufactured in accordance with the following standards:

STANDARD	TOPIC
ASTM F 441	Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe, Schedule 40 and 80.
ASTM F 439	Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80.
ASTM F 437	Standard Specification for Threaded Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80.
ASTM D 2846	Standard Specification for Chlorinated Polyvinyl Chloride (CPVC) Plastic Hot- and Cold-Water Distribution Systems.
ASTM D 1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds.
EN-ISO 15877:2003	Plastics Piping Systems for Hot and Cold Water Installations - Chlorinated Poly Vinyl Chloride (PVC - C).
DIN 8079	Chlorinated Polyvinyl chloride (PVC-C) Pipes – dimensions.
DIN 8080	Chlorinated Polyvinyl chloride (PVC-C) Pipes – general quality and testing.

PIPE SPECIFICATIONS

ASTM F 441 : Sch80 Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipes

Nominal Size in Inch	Outside Diameter		Schedule 80 Minimum Wall Thickness		Water Pressure Rating (BAR)	
	Inch	mm	Inch	mm	at 82°C	at 23°C
¼	0.540	13.70	0.119	3.02	19.30	77.90
⅜	0.675	17.10	0.126	3.20	15.90	63.40
½	0.840	21.34	0.147	3.37	14.50	58.60
¾	1.050	26.67	0.154	3.91	11.70	47.60
1	1.315	33.40	0.179	4.55	10.70	43.40
1¼	1.660	42.20	0.191	4.85	9.00	35.90
1½	1.900	48.30	0.200	5.08	7.90	32.40
2	2.375	60.33	0.218	5.54	6.90	27.60
2½	2.875	73.00	0.276	7.01	7.20	29.00
3	3.500	88.90	0.300	7.62	6.20	25.50
4	4.500	114.30	0.337	8.56	5.50	22.10
6	6.625	168.30	0.432	10.97	4.80	19.30
8	8.625	219.00	0.500	12.70	4.10	17.20

Note: Pressure Rating Applies for Water and for Unthreaded Pipes

ASTM F 441 : Sch40 Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipes

Nominal Size in Inch	Outside Diameter		Schedule 40 Minimum Wall Thickness		Water Pressure Rating (BAR)	
	Inch	mm	Inch	mm	at 82°C	at 23°C
¼	0.540	13.70	0.088	2.24	13.40	53.80
⅜"	0.675	17.10	0.091	2.31	10.70	42.70
½	0.840	21.34	0.109	2.77	10.30	41.40
¾	1.050	26.67	0.113	2.87	8.30	33.10
1	1.315	33.40	0.133	3.38	7.60	31.00
1¼	1.660	42.20	0.140	3.56	6.20	25.50
1½	1.900	48.30	0.145	3.68	5.50	22.80
2	2.375	60.33	0.154	3.91	4.80	19.30
2½	2.875	73.00	0.203	5.16	5.20	20.70
3	3.500	88.90	0.216	5.49	4.50	17.90
4	4.500	114.30	0.237	6.02	3.80	15.20
6	6.625	168.30	0.280	7.11	3.10	12.40
8	8.625	219.00	0.322	8.18	2.80	11.00

Note: Pressure Rating Applies for Water and for Unthreaded Pipes

DIN 8079 : Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipes

Nominal Size (mm)	Pressure Rating at 20˚C		
	PN16	PN20	PN25
	Wall Thickness (mm)	Wall Thickness (mm)	Wall Thickness (mm)
16	1.2	1.5	1.8
20	1.5	1.9	2.3
25	1.9	2.3	2.8
32	2.4	2.9	3.6
40	3.0	3.7	4.5
50	3.7	4.6	5.6
63	4.7	5.8	7.1
75	5.6	6.8	8.4
90	6.7	8.2	10.1
110	8.1	10.0	12.3

FITTINGS PRODUCT RANGE

SOCKET

Art No.	Item	PCS/CTN
C-S-½	½”	600
C-S-¾	¾”	400
C-S-1	1”	240
C-S-1¼	1¼”	199
C-S-1½	1½”	140
C-S-2	2”	81
C-S-2½	2½”	54
C-S-3	3”	36
C-S-4	4”	14

90° ELBOW

Art No.	Item	PCS/CTN
C-E90-½	½”	500
C-E90-¾	¾”	270
C-E90-1	1”	180
C-E90-1¼	1¼”	99
C-E90-1½	1½”	72
C-E90-2	2”	41
C-E90-2½	2½”	36
C-E90-3	3”	14
C-E90-4	4”	12

45° ELBOW

Art No.	Item	PCS/CTN
C-E45-½	½”	500
C-E45-¾	¾”	300
C-E45-1	1”	180
C-E45-1¼	1¼”	120
C-E45-1½	1½”	90
C-E45-2	2”	48
C-E45-2½	2½”	30
C-E45-3	3”	20
C-E45-4	4”	10

EQUAL TEE

Art No.	Item	PCS/CTN
C-T-½	½"	300
C-T-¾	¾"	180
C-T-1	1"	100
C-T-1¼	1¼"	70
C-T-1½	1½"	52
C-T-2	2"	30
C-T-2½	2½"	22
C-T-3	3"	18
C-T-4	4"	10

REDUCING TEE

Art No.	Item	PCS/CTN
C-T-¾.½	¾"x½"	200
C-T-1.½	1"x½"	120
C-T-1.¾	1"x¾"	110
C-T-1¼.¾	1¼"x¾"	95
C-T-1¼.1	1¼"x1"	82
C-T-1½.1	1½"x1"	56
C-T-1½.1¼	1½"x1¼"	48
C-T-2.1¼	2"x1¼"	36
C-T-2.1½	2"x1½"	36
C-T-2½.1½	2½"x1½"	28
C-T-2½.2	2½"x2"	21
C-T-3.2	3"x2"	20
C-T-3.2½	3"x2½"	20
C-T-4.2½	4"x2½"	12
C-T-4.2	4"x"2	16

REDUCING SOCKET

Art No.	Item	PCS/CTN
C-RS-¾.½	¾"x½"	480
C-RS-1.½	1"x½"	320
C-RS-1.¾	1"x¾"	280
C-RS-1¼.¾	1¼"x¾"	318
C-RS-1¼.1	1¼"x1"	196
C-RS-1½.1	1½"x1"	200
C-RS-1½.1¼	1½"x1¼"	120
C-RS-2.1¼	2"x1¼"	112
C-RS-2.1½	2"x1½"	112
C-RS-2½.1½	2½"x1½"	60
C-RS-2½.2	2½"x2"	45
C-RS-3.2	3"x2"	48
C-RS-3.2½	3"x2½"	36
C-RS-4.2½	4"x2½"	21
C-RS-4.2	4"x"2	14

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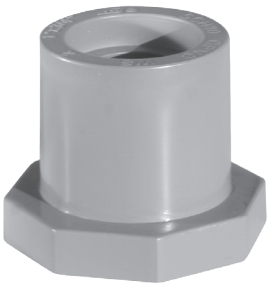
REDUCING BUSH



Art No.	Item	PCS/CTN
C-RB-¾.½	¾"x½"	850
C-RB-1.¾	1"x¾"	550
C-RB-1¼.1	1¼"x1"	360
C-RB-1½.1¼	1½"x1¼"	270
C-RB-2.1½	2"x1½"	154
C-S-2½.2	2½"x2"	120
C-RB-3.2½	3"x2½"	60
C-RB-4.3	4"x3"	20

END CAP

Art No.	Item	PCS/CTN
C-EC-½	½"	1200
C-EC-¾	¾"	570
C-EC-1	1"	500
C-EC-1¼	1¼"	317
C-EC-1½	1½"	240
C-EC-2	2"	146
C-EC-2½	2½"	75
C-EC-3	3"	52
C-EC-4	4"	28

UNION

Art No.	Item	PCS/CTN
C-UN-½	½"	275
C-UN-¾	¾"	180
C-UN-1	1"	120
C-UN-1¼	1¼"	96
C-UN-1½	1½"	48
C-UN-2	2"	36

FEMALE THREADED ELBOW

Art No.	Item	PCS/CTN
C-FE-½	½"	420
C-FE-¾	¾"	250
C-FE-1	1"	170

FEMALE THREADED ADAPTER

Art No.	Item	PCS/CTN
C-FA-½	½"	700
C-FA-¾	¾"	450
C-FA-1	1"	280
C-FA-1¼	1¼"	198
C-FA-1½	1½"	139
C-FA-2	2"	72
C-FA-2½	2½"	45
C-FA-3	3"	36
C-FA-4	4"	12

MALE THREADED ADAPTER

Art No.	Item	PCS/CTN
C-MA-½	½"	1000
C-MA-¾	¾"	600
C-MA-1	1"	350
C-MA-1¼	1¼"	150
C-MA-1½	1½"	200
C-MA-2	2"	130
C-MA-2½	2½"	60
C-MA-3	3"	48
C-MA-4	4"	18

FEMALE THREADED TEE

Art No.	Item	PCS/CTN
C-FT-½	½"	300
C-FT-¾	¾"	180
C-FT-1	1"	110

FEMALE THREADED CAP

Art No.	Item	PCS/CTN
C-FC-½	½"	1200
C-FC-¾	¾"	750
C-FC-1	1"	480

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MALE THREADED ELBOW 90˚

Art No.	Item	PCS/CTN
C-ME-½	½”	420
C-ME-¾	¾”	280
C-ME-1	1”	150

MALE ADAPTER WITH BRASS THREAD

Art No.	Item	PCS/CTN
C-BMA-½	½”	400
C-BMA-¾	¾”	220
C-BMA-1	1”	175
C-BMA-1¼	1¼”	120
C-BMA-1½	1½”	100
C-BMA-2	2”	60

FEMALE ADAPTER WITH BRASS THREAD

Art No.	Item	PCS/CTN
C-BFA-½	½”x ½”	200
C-BFA-½.¾	½”x¾”	200
C-BFA-¾	¾”x¾”	200
C-BFA-¾.½	¾”x½”	200
C-BFA-1	1”x1”	100

FEMALE ELBOW WITH BRASS THREAD

Art No.	Item	PCS/CTN
C-BFE-½	½”x ½”	180
C-BFE-½.¾	½”x¾”	180
C-BFE-¾	¾”x¾”	144
C-BFE-¾.½	¾”x½”	144

Cosmoplast

FEMALE TEE WITH BRASS THREAD

Art No.	Item	PCS/CTN
C-BFT-½	½"x ½"	110
C-BFT-½.¾	½"x¾"	110
C-BFT-¾	¾"x¾"	90
C-BFT-¾.½	¾"x½"	90

MALE THREADED PLUG

Art No.	Item	PCS/CTN
C-MP-½	½"	1200
C-MP-¾	¾"	700
C-MP-1	1"	375
C-MP-1¼	1¼"	420
C-MP-1½	1½"	315
C-MP-2	2"	168

DOUBLE UNION BALL VALVE

Art No.	Item	PCS/CTN
C-DUV-½	½"	96
C-DUV-¾	¾"	60
C-DUV-1	1"	48
C-DUV-1¼	1¼"	42
C-DUV-1½	1½"	36
C-DUV-2	2"	20
C-DUV-2½	2½"	8
C-DUV-3	3"	4
C-DUV-4	4"	2

SINGLE UNION BALL VALVE

Art No.	Item	PCS/CTN
C-SUV-½	½"	120
C-SUV-¾	¾"	81
C-SUV-1	1"	50
C-SUV-1¼	1¼"	42
C-SUV-1½	1½"	20
C-SUV-2	2"	20
C-SUV-3	3"	8
C-SUV-4	4"	2

Intertek
UKAS MANAGEMENT SYSTEMS

CHEMICAL RESISTANCE OF CPVC

The resistance of CPVC material to wide range of chemicals is listed in the below table.

The symbols used in the tables are as below:

NR : Not Resistant.
R : Resistant.
C : To be used with Caution, actual testing suggested.
NA : Date unavailable, actual testing required.

CHEMICAL	Temperature		
	20°C	60°C	80°C
Acetaldehyde	NR	NR	NR
Acetamide	NR	NR	NR
Acetic Acid, 10%	R	R	R
Acetic Acid, 20%	NR	NR	NR
Acetic Acid, Glacial	NR	NR	NR
Acetic Acid, pure	NR	NR	NR
Acetic Anhydride	NR	NR	NR
Acetone, < 5%	R	R	R
Acetone, > 5%	NR	NR	NR
Acetyl Nitrile	NR	NR	NR
Acetylene	C	C	C
Acrylic Acid	NR	NR	NR
Adipic Acid; sat. in water	R	R	R
Allyl Alcohol, 96%	C	C	C
Allyl Chloride	NR	NR	NR
Alum, all varieties	R	R	R
Aluminum Acetate	R	R	R
Aluminum Alum	R	R	R
Aluminum Chloride	R	R	R
Aluminum Fluoride	R	R	R
Aluminum Hydroxide	R	R	R
Aluminum Nitrate	R	R	R
Aluminum Sulfate	R	R	R
Amines	NR	NR	NR
Ammonia (gas;dry)	NR	NR	NR
Ammonia (liquid)	NR	NR	NR
Ammonium Acetate	R	R	R
Ammonium Alum	R	R	R
Ammonium Bisulfate	R	R	R
Ammonium Carbonate	R	R	R
Ammonium Chloride	R	R	R
Ammonium Dichromate	R	R	R
Ammonium Fluoride, <25%	R	R	R

CHEMICAL	Temperature		
	20°C	60°C	80°C
Ammonium Fluoride, >25%	R	R	R
Ammonium Hydroxide	NR	NR	NR
Ammonium Metaphosphate	R	R	R
Ammonium Nitrate	R	R	R
Ammonium Persulfate	R	NA	NA
Ammonium Phosphate	R	R	C
Ammonium Sulfate	R	R	R
Ammonium Sulfide	R	R	R
Ammonium Tartrate	R	R	R
Ammonium Thiocyanate	R	R	R
Amyl Acetate	NR	NR	NR
Amyl Alcohol	C	C	NR
Amyl Chloride	NR	NR	NR
Aniline	NR	NR	NR
Aniline Chlorohydrate	NR	NR	NR
Aniline Hydrochloride	NR	NR	NR
Anthraquinone	NA	NA	NA
Anthraquinone Sulfonic Acid	NA	NA	NA
Antimony Trichloride	R	R	R
Aqua Regia	R	NR	NR
Aromatic Hydrocarbons	NR	NR	NR
Arsenic Acid, 80%	R	R	R
Arsenic Trioxide (powder)	R	NR	NR
Arylsulfonic Acid	NA	NA	NA
Barium Carbonate	R	R	R
Barium Chloride	R	R	R
Barium Hydroxide, 10%	R	R	R
Barium Nitrate	R	R	R
Barium Sulfate	R	R	R
Barium Sulfide	R	R	R
Beer	R	R	R
Beet Sugar Liquors	R	R	R
Benzaldehyde;<=10%	NR	NR	NR
Benzaldehyde;>10%	NR	NR	NR
Benzalkonium Chloride	NR	NR	NR
Benzene	NR	NR	NR
Benzoic Acid	R	C	NR
Benzyl Alcohol	NR	NR	NR
Benzyl Chloride	NR	NR	NR
Bismuth Carbonate	R	R	R
Black Liquor	R	R	R
Bleach (15% CL)	R	R	R
Borax	R	R	R
Boric Acid	R	R	R
Brine (acid)	R	R	R
Bromic Acid	R	R	R
Bromine Liquid	NR	NR	NR

CHEMICAL	Temperature		
	20°C	60°C	80°C
Bromine Vapor, 25%	NR	NR	NR
Bromine Water	NA	NA	NA
Bromobenzene	NR	NR	NR
Bromotoluene	NR	NR	NR
Butadiene	C	C	C
Butane	C	C	C
Butanol, primary	C	C	C
Butanol, secondary	C	C	C
Butyl Acetate	NR	NR	NR
Butyl Carbitol	NR	NR	NR
Butyl Mercaptan	NR	NR	NR
Butyl Phenol	NR	NR	NR
Butyl Stearate	NR	NR	NR
ButylCellosolve	NR	NR	NR
Butyne Diol	NA	NA	NA
Butyric Acid ,<1%	R	R	R
Butyric Acid, >1%	NR	NR	NR
Cadmium Acetate	R	R	R
Cadmium Chloride	R	R	R
Cadmium Cyanide	R	R	R
Cadmium Sulfate	R	R	R
Caffeine Citrate	R	R	R
Calcium Acetate	R	R	R
Calcium Bisulfide	R	R	R
Calcium Bisulfite	R	R	R
Calcium Bisulfite Bleach Liquor	R	R	R
Calcium Carbonate	R	R	R
Calcium Chlorate	R	R	R
Calcium Chloride	R	R	R
Calcium Hydroxide	R	R	R
Calcium Hypochlorite	R	R	R
Calcium Nitrate	R	R	R
Calcium Oxide	R	R	R
Calcium Sulfate	R	R	R
Camphor (crystals)	NR	NR	NR
Cane Sugar Liquors	R	R	R
Caprolactam	NR	NR	NR
Caprolactone	NR	NR	NR
Carbitol	NR	NR	NR
Carbon Dioxide	R	R	R
Carbon Dioxide (aqueous solution)	R	R	R
Carbon Disulfide	NR	NR	NR
Carbon Monoxide	R	R	R
Carbon Tetrachloride	NR	NR	NR
Carbonic Acid	R	R	R
Carene 500	NA	NA	NA
Castor oil	NR	NR	NR

CHEMICAL	Temperature		
	20°C	60°C	80°C
Caustic Potash	R	R	R
Caustic Soda	R	R	R
Cellosolve	NR	NR	NR
Cellosolve Acetate	NR	NR	NR
Chloral Hydrate	NR	NR	NR
Chloramine	R	R	R
Chloric Acid, up to 20%	R	R	R
Chloride Water	R	R	R
Chlorinated Solvents	NR	NR	NR
Chlorinated Water (Hypochlorite)	R	R	R
Chlorine (dry liquid)	NR	NR	NR
Chlorine (liquid under pressure)	NR	NR	NR
Chlorine Dioxide, aqueous (sat'd 0.1%)	R	NA	NA
Chlorine Gas (dry)	NR	NR	NR
Chlorine Gas (wet)	NR	NR	NR
Chlorine Water (sat'd 0.3%)	R	R	R
Chlorine(trace in air)	R	R	R
Chloroacetic Acid	NR	NR	NR
Chloroacetyl Chloride	NR	NR	NR
Chlorobenzene	NR	NR	NR
Chloroform	NR	NR	NR
Chloropicrin	NR	NR	NR
Chlorosulfonic Acid	NR	NR	NR
Chlorox Bleach Solution	C	C	C
Chrome Alum	R	R	R
Chromic Acid, 10%	R	R	R
Chromic Acid, 40%	R	R	R
Chromic Acid, 50%	NA	NA	NA
Chromic Acid/Sulfuric Acid/water-50%/15%/35%	NA	NA	NA
Chromic/Nitric Acid (15%/35%)	R	C	NR
ChromiumNitrate	R	R	R
Citric Acid	R	R	R
Citrus Oils	NR	NR	NR
Coconut Oil	R	R	R
Copper Acetate	R	R	R
Copper Carbonate	R	R	R
Copper Chloride	R	R	R
Copper Cyanide	R	R	R
Copper Fluoride	R	R	R
Copper Nitrate	R	R	R
Copper Sulfate	R	R	R
Corn Oil	C	C	C
Corn Syrup	R	R	R
Cottonseed Oil	C	C	C
Creosote	NR	NR	NR
Cresylic Acid,50%	NR	NR	NR
Crotonaldehyde	NR	NR	NR

CHEMICAL	Temperature		
	20°C	60°C	80°C
Crude Oil	NR	NR	NR
Cumene	NR	NR	NR
Cupric Fluoride	R	R	R
Cupric Sulfate	R	R	R
Cuprous Chloride	R	R	R
Cyclanones	NA	NA	NA
Cyclohexane	NR	NR	NR
Cyclohexanol	NR	NR	NR
Cyclohexanone	NR	NR	NR
D.D.T. (Xylene Base)	NR	NR	NR
Desocyephedrine Hydrochloride	NA	NA	NA
Detergents	C	C	C
Dextrin	R	R	R
Dextrose	R	R	R
Diacetone Alcohol	C	NA	NA
Diazo Salts	NA	NA	NA
Dibutoxy Ethyl Phthalate	NR	NR	NR
Dibutyl Phthalate	NR	NR	NR
Dibutyl Sebacate	NR	NR	NR
Dichlorobenzene	NR	NR	NR
Dichloroethylene	NR	NR	NR
Diesel Fuels	NR	NR	NR
Diethyl Ether	NR	NR	NR
Diethylamine	NR	NR	NR
Diglycolic Acid	NR	NR	NR
Dill Oil	NR	NR	NR
Dimethyl Hydrazine	NR	NR	NR
Dimethylamine	NR	NR	NR
Dimethylformamide	NR	NR	NR
Dioctylphthalate	NR	NR	NR
Dioxane (1, 4)	NR	NR	NR
Disodium Phosphate	R	R	R
Distilled Water	R	R	R
EDTA, Tetrasodium	R	R	R
Ehtyl Ester (ethyl acrylate)	NR	NR	NR
Epsom Salt	R	R	R
Esters	NR	NR	NR
Ethanol, > 5%	C	C	C
Ethanol, up to 5%	R	R	R
Ethers	NR	NR	NR
Ethyl Acetate	NR	NR	NR
Ethyl Acrylate	NR	NR	NR
Ethyl Alcohol	C	C	C
Ethyl Chloride	NR	NR	NR
Ethyl Chloroacetate	NR	NR	NR
Ethyl Ether	NR	NR	NR
Ethylene Bromide	NR	NR	NR

CHEMICAL	Temperature		
	20°C	60°C	80°C
Ethylene Chlorohydrin	NR	NR	NR
Ethylene Diamine	NR	NR	NR
Ethylene Dichloride	NR	NR	NR
Ethylene Glycol	C	C	C
Ethylene Oxide	NR	NR	NR
Fatty Acids	C	C	C
Ferric Acetate	R	R	R
Ferric Chloride	R	R	R
Ferric Hydroxide	R	R	R
Ferric Nitrate	R	R	R
Ferric Sulfate	R	R	R
Ferrous Chloride	R	R	R
Ferrous Hydroxide	R	R	R
Ferrous Nitrate	R	R	R
Ferrous Sulfate	R	R	R
Fish Solubles	NA	NA	NA
Fluorine Gas	NR	NR	NR
Fluorine Gas (wet)	NR	NR	NR
Fluoroboric Acid	NA	NA	NA
Fluorosilisic Acid, 25%	R	C	C
Formaldehyde	NR	NR	NR
Formic Acid, <25%	R	R	R
Formic Acid, >25%	C	NA	NR
Freon 11	NR	NR	NR
Freon 113	NR	NR	NR
Freon 114	NR	NR	NR
Freon 12	NR	NR	NR
Freon 21	NR	NR	NR
Freon 22	NR	NR	NR
Fructcose	R	R	R
Fruit juices & pulp	R	R	R
Furfural	NR	NR	NR
Gallic Acid	NA	NA	NA
Gas (Coke Oven)	NA	NA	NA
Gasoline	NR	NR	NR
Gasoline, HighOctane	NR	NR	NR
Gasoline, Jet Fuel	NR	NR	NR
Glucose	R	R	R
Glycerine	R	R	R
Glycol	C	C	C
Glycol Ethers	NR	NR	NR
Glycolic Acid	NA	NA	NA
Grape Sugar	R	R	R
Green Liquor	R	R	R
Halocarbon Oils	C	C	C
Heptane	R	NA	NA
Hercolyn	NA	NA	NA

CHEMICAL	Temperature		
	20°C	60°C	80°C
Hexane	C	C	C
Hexanol, Tertiary	C	C	C
Hydrazine	NR	NR	
Hydrobromic Acid, 20%	NA	NA	NA
Hydrochloric Acid, 10%	R	R	R
Hydrochloric Acid, 30%	R	R	R
Hydrochloric Acid, 36%	R	R	C
Hydrochloric Acid, Concentrated	NA	NA	NA
Hydrochloric Acid, pickling	R	R	R
Hydrocyanic Acid	NA	NA	NA
Hydrofluoric Acid, <3%	R	NA	NA
Hydrofluoric Acid, 48%	NR	NR	NR
Hydrofluoric Acid, 50%	NR	NR	NR
Hydrofluoric Acid, 70%	NR	NR	NR
HydrofluorsilicicAcid, 30%	R	NA	C
Hydrogen	C	C	C
Hydrogen Peroxide, 30%	R	NA	NA
Hydrogen Peroxide, 90%	NA	NA	NA
Hydrogen Phosphide	NA	NA	NA
Hydrogen Sulfide	R	R	R
Hydroquinone	R	R	R
Hydroxylamine Sulfate	NA	NA	NA
Hypochlorite (Potassium & Sodium)	R	R	R
Hypochlorous Acid	C	C	C
Iodine	R	R	R
Iodine Solution, 10%	NA	NA	NA
Isopropanol	C	C	C
Kerosene	C	C	C
Ketones	NR	NR	NR
Kraft Liquors	R	R	R
Lactic Acid, 25%	R	R	R
Lactic Acid, 80%	R	C	C
Lard Oil	C	C	C
Lauric Acid	C	C	C
Lauryl Chloride	NR	NR	NR
Lead Acetate	R	R	R
Lead Chloride	R	R	R
Lead Nitrate	R	R	R
Lead Sulfate	R	R	R
Lemon Oil	NR	NR	NR
Limonene	NR	NR	NR
Linoleic Acid	C	C	C
Linoleic Oil	C	C	C
Linseed Oil	NR	NR	NR
Liquors	NA	NA	NA
Lithium Bromide	R	R	R
Lithium Sulfate	R	R	R

CHEMICAL	Temperature		
	20°C	60°C	80°C
Lubricating Oils, ASTM#1	NA	NA	NA
Lubricating Oils, ASTM#2	NA	NA	NA
Lubricating Oils, ASTM#3	NA	NA	NA
Lux Liquid	NA	NA	NA
Machine Oil	C	C	C
Magnesium Carbonate	R	R	R
Magnesium Chloride	R	R	R
Magnesium Citrate	R	R	R
Magnesium Fluoride	R	R	R
Magnesium Hydroxide	R	R	R
Magnesium Nitrate	R	R	R
Magnesium Oxide	R	R	R
Magnesium Salts	R	R	R
Magnesium Sulfate	R	R	R
Maleic Acid, 50%	R	R	R
Manganese Chloride	R	R	R
Manganese Sulfate	R	R	R
Mercural Ointment, Blue 5%	NA	NA	NA
Mercuric Chloride	R	R	R
Mercuric Cyanide	R	R	R
Mercuric Sulfate	R	R	R
Mercurous Nitrate	R	R	R
Mercury	R	R	R
Mercury Ointment, Ammoniated	NA	NA	NA
Methanol, <10%	R	R	R
Methanol, >10%	NR	NR	NR
Methoxyethyl Oleate	NR	NR	NR
Methyl Cellosolve	NR	NR	NR
Methyl Chloride	NR	NR	NR
Methyl Ethyl Ketone	NR	NR	NR
Methyl Formate	NR	NR	NR
Methyl Iso-Butyl Ketone	NR	NR	NR
Methyl Methacrylate	NR	NR	NR
Methyl Salicylate	NR	NR	NR
Methyl Sulfate	NA	NA	NA
Methyl Sulfuric Acid	NA	NA	NA
Methylamine	NR	NR	NR
Methylene Bromide	NR	NR	NR
Methylene Chloride	NR	NR	NR
Methylene Chlorobromide	NR	NR	NR
Methylene Iodine	NR	NR	NR
Milk	R	R	NA
Mineral Oil	R	NA	NA
Molasses	R	R	R
Monoethanolamine	NR	NR	NR
Motor Oil	R	NA	NA
Muriatic Acid	R	R	C

CHEMICAL	Temperature		
	20°C	60°C	80°C
Naphtha	C	C	C
Naphthalene	NR	NR	NR
Natural Gas	C	C	C
Nickel Acetate	R	R	R
Nickel Chloride	R	R	R
Nickel Nitrate	R	R	R
Nickel Sulfate	R	R	R
Nicotine	R	R	R
Nicotine Acid	R	R	R
Nitric Acid, 10%	R	R	R
Nitric Acid, 25%	R	R	R
Nitric Acid, 25-35%	R	C	C
Nitric Acid, 60%	R	NA	NR
Nitric Acid, 68%	R	NA	NR
Nitric Acid, Anhydrous	NR	NR	NR
Nitrobenzene	NR	NR	NR
Nitroglycerine	NR	NR	NR
Nitroglycol	NA	NA	NA
Nitrous Oxide	R	R	R
Ocenol	NA	NA	NA
Octanol (1)	C	NR	NR
Oil, Sour Crude	NR	NR	NR
Oils & Fats	C	C	C
Oils, Edible	NR	NR	NR
Oleic Acid	C	C	C
Oleum	NR	NR	NR
Olive Oil	NR	NR	NR
Oxalic Acid, sat'd	R	C	C
Oxygen	R	R	R
Ozone	R	R	R
Ozonized water	R	NA	NA
Palm Oil	NR	NR	NR
Palmitic Acid, 10%	C	C	C
Palmitic Acid, 70%	C	C	C
Paraffin	R	R	NA
Peanut Oil	NR	NR	NR
Peracetic Acid, 40%	NR	NR	NR
Perchloric Acid, 10%	R	NA	NA
Perchloric Acid, 15%	NA	NA	NA
Perchloric Acid, 70%	NA	NA	NA
Perphosphate	NA	NA	NA
Petroleum Liquifier	NA	NA	NA
Petroleum Oils (Sour)	C	C	C
Phenol	R	R	R
Phenylhydrazine	NR	NR	NR
Phenylhydrazine Hydrochloride	NR	NR	NR
Phosgene, Gas	NR	NR	NR

CHEMICAL	Temperature		
	20°C	60°C	80°C
Phosgene, Liquid	NR	NR	NR
Phosphoric Acid, up to 85%	R	R	R
Phosphorous Pentoxide	R	R	R
Phosphorous Trichloride	NR	NR	NR
Phosphorous, (Yellow)	R	R	R
Photographic Solutions: Dektal Developer	NA	NA	NA
Photographic Solutions: DK #3	NA	NA	NA
Photographic Solutions: Kodak Fixer	NA	NA	NA
Photographic Solutions: Kodak Short Stop	NA	NA	NA
Picric Acid	NR	NR	NR
Plating Solutions: Brass	R	R	R
Plating Solutions: Cadmium	R	R	R
Plating Solutions: Copper	R	R	R
Plating Solutions: Gold	R	R	R
Plating Solutions: Indium	R	R	R
Plating Solutions: Lead	R	R	R
Plating Solutions: Nickel	R	R	R
Plating Solutions: Rhodium	R	R	R
Plating Solutions: Silver	R	R	R
Plating Solutions: Tin	R	R	R
Plating Solutions: Zinc	R	R	R
Polyethylene Glycol	NR	NR	NR
Potash (Sat.Aq.)	R	R	R
Potassium Acetate	R	R	R
Potassium Alum	R	R	R
Potassium Amyl Xanthate	NA	NA	NA
Potassium Bicarbonate	R	R	R
Potassium Bichromate	R	R	R
Potassium Bisulfate	R	R	R
Potassium Borate	R	R	R
Potassium Bromate	R	R	R
Potassium Bromide	R	R	R
Potassium Carbonate	R	R	R
Potassium Chlorate	R	R	R
Potassium Chloride	R	R	R
Potassium Chromate	R	R	R
Potassium Cyanate	R	R	R
Potassium Cyanide	R	R	R
Potassium Dichromate	R	R	R
Potassium Ethyl Xanthate	NA	NA	NA
Potassium Ferricyanide	R	R	R
Potassium Ferrocyanide	R	R	R
Potassium Fluoride	R	R	R
Potassium Hydroxide	R	R	R
Potassium Hypochlorite	R	R	R
Potassium Iodide	R	R	R
Potassium Nitrate	R	R	R

CHEMICAL	Temperature		
	20°C	60°C	80°C
Potassium Perborate	R	R	R
Potassium Perchlorate	R	R	R
Potassium Permanganate, 10%	R	R	R
Potassium Permanganate, 25%	R	R	C
Potassium Persulfate	R	NA	NA
Potassium Phosphate	R	R	R
Potassium Sulfate	R	R	R
Potassium Sulfide	R	R	R
Potassium Sulfite	R	R	R
Potassium Tripolyphosphate	R	R	R
Propane	C	C	C
Propane Gas	C	C	C
Propanol, >0.5%	C	C	C
Propanol,<= 0.5%	R	R	R
Propargyl Alcohol	C	C	C
Propionic Acid,<=2%	R	R	R
Propionic Acid,>2%	NR	NR	NR
Propylene Dichloride	NR	NR	NR
Propylene Glycol, >25%	NR	NR	NR
Propylene Glycol,<=25%	C	C	C
Propylene Oxide	NR	NR	NR
Pyridine	NR	NR	NR
Pyrogallic Acid	NA	NA	NA
Rayon Coagulating Bath	NA	NA	NA
Refinery Crudes	C	C	C
Rochelle Salts	R	R	R
Salicylic Acid	R	R	R
Santicizer	NA	NA	NA
Sea Water	R	R	R
Selenic Acid	NA	NA	NA
Sewage	R	R	R
Silicic Acid	R	NA	NA
Silicone Oil	R	NA	NA
Silver Chloride	R	R	R
Silver Nitrate	R	R	R
Silver Sulfate	R	R	R
SilverCyanide	R	R	R
Soaps	R	R	R
Sodium Acetate	R	R	R
Sodium Alum	R	R	R
Sodium Arsenate	R	NA	NA
Sodium Benzoate	R	R	R
Sodium Bicarbonate	R	R	R
Sodium Bichromate	R	R	R
Sodium Bisulfate	R	R	R
Sodium Bisulfite	R	R	R
Sodium Borate	R	R	R

Cosmoplast

CHEMICAL	Temperature		
	20°C	60°C	80°C
Sodium Bromide	R	R	R
Sodium Carbonate	R	R	R
Sodium Chlorate	R	R	R
Sodium Chloride	R	R	R
Sodium Chlorite	R	R	R
Sodium Chromate	R	R	R
Sodium Cyanide	R	R	R
Sodium Dichromate	R	R	R
Sodium Ferricyanide	R	R	R
Sodium Ferrocyanide	R	R	R
Sodium Fluoride	R	R	R
Sodium Formate	R	R	R
Sodium Hydroxide, 50%	R	R	R
Sodium Hypobromite	R	R	R
Sodium Hypochlorite	R	R	R
Sodium Iodide	R	R	R
Sodium Metaphosphate	R	R	R
Sodium Nitrate	R	R	R
Sodium Nitrite	R	R	R
Sodium Perchlorate	R	R	R
Sodium Peroxide	R	R	R
Sodium Silicate	R	R	R
Sodium Sulfate	R	R	R
Sodium Sulfide	R	R	R
Sodium Sulfite	R	R	R
Sodium Thiosulfate	R	R	R
Sodium Tripolyphosphate	R	R	R
Sour Crude Oil	C	C	C
Soybean Oil	NR	NR	NR
Stannic Chloride	R	R	R
Stannous Chloride	R	R	R
Stannous Sulfate	R	R	R
Starch	R	R	R
Stearic Acid	R	NA	NA
Stoddards Solvent	C	C	C
Styrene	NR	NR	NR
Succinic Acid	R	R	R
Sugar	R	R	R
Sulfamic Acid	R	R	R
Sulfite Liquor	NA	NA	NA
Sulfur	R	NA	NA
Sulfur Dioxide, dry	R	R	R
Sulfur Dioxide, wet	R	R	R
Sulfur Trioxide	R	R	R
Sulfuric Acid, 70%	R	R	R
Sulfuric Acid, 80%	R	R	R
Sulfuric Acid, 85%	R	C	NR

CHEMICAL	Temperature		
	20°C	60°C	80°C
Sulfuric Acid, 90%	R	C	NR
Sulfuric Acid, 98%	R	NR	NR
Sulfuric Acid, Fuming	NR	NR	NR
Sulfuric Acid, Pickling	R	R	R
Sulfurous Acid	NA	NA	NA
Tall Oil	C	C	C
Tan Oil	NA	NA	NA
Tannic Acid, 30%	R	NA	NA
Tanning Liquors	NA	NA	NA
Tartaric Acid	R	NA	NA
Terpenes	NR	NR	NR
Terpineol	NR	NR	NR
Tetraethyl Lead	NA	NA	NA
Texanol	NR	NR	NR
Texanol	NR	NR	NR
Thionyl Chloride	NR	NR	NR
Thread Cutting Oil	C	C	C
Titanium Tetrachloride	NA	NA	NA
Toluol or Toluene	NR	NR	NR
Transformer Oil	C	C	C
Tributyl Citrate	NR	NR	NR
Tributyl Phosphate	NR	NR	NR
Trichloroacetic Acid	NR	NR	NR
Trichloroethylene	NR	NR	NR
Triethanolamine	NR	NR	NR
Trilones	NA	NA	NA
Trimethyl Propane	NA	NA	NA
Trimethylamine	NA	NA	NA
Trisodium Phosphate	R	R	R
Turpentine	NR	NR	NR
Urea	R	R	R
Urine	R	R	R
Vaseline	NA	NA	NA
Vegetable Oils	NR	NR	NR
Vinegar	R	R	R
Vinyl Acetate	NR	NR	NR
Water, Acid Mine	R	R	R
Water, Deionized	R	R	R
Water, Demineralized	R	R	R
Water, Distilled	R	R	R
Water, Fresh & Salt	R	R	R
Water, Swimming Pool	R	R	R
WD-40	C	C	C
Whiskey	R	R	R
White Liquor	R	R	R
Wines	R	R	R
Xylene or Xylol	NR	NR	NR
Zinc Acetate	R	R	R
Zinc Carbonate	R	R	R
Zinc Chloride	R	R	R
Zinc Nitrate	R	R	R
Zinc Sulfate	R	R	R


CERTIFICATE OF REGISTRATION

This is to certify that the quality management system of:

COSMOPLAST INDUSTRIAL COMPANY LLC

Main Site: Plot No. 35H5, 36H5, H5 ICAD-1, P.O. Box 8593, Abu Dhabi, United Arab Emirates

has been registered by Intertek as conforming to the requirements of:

ISO 9001:2015

The management system is applicable to:

Manufacture and Sale of Pipeline System Products covering: Polyvinyl Chloride (PVC) Pipes and Fittings, Polyethylene (PE) Pipes and Fittings, Cross linked Polyethylene (PEX) Pipes and Fittings, Poly Propylene (PP) Pipes and Fittings, Pre Insulated Pipes and Fittings.

Certificate Number: QMS 180302 - 01

Initial Certification Date: 04 June 2003

Date of Certification Decision: 09 March 2018

Issuing Date: 09 March 2018

Valid Until: 26 May 2021

Calin Moldovean
President Business Assurance

Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZF

Intertek Certification Limited is a UKAS accredited body under schedule of Accreditation No. 014

1st Surveillance Audit Due:
From 09 July 2018 to 09 August 2018

In the issuance of this certificate, Intertek assumes no liability to any party other than to the Client, and then only in accordance with the agreed upon Certification Agreement. This certificate's validity is subject to the organization maintaining their system in accordance with Intertek's requirements for systems certification. Validity may be confirmed via email at certificate.validation@intertek.com or by scanning the code to the right with a smartphone. The certificate remains the property of Intertek, to whom it must be returned upon request.


NSF International
789 N. Dixboro Road, Ann Arbor, MI 48105 USA

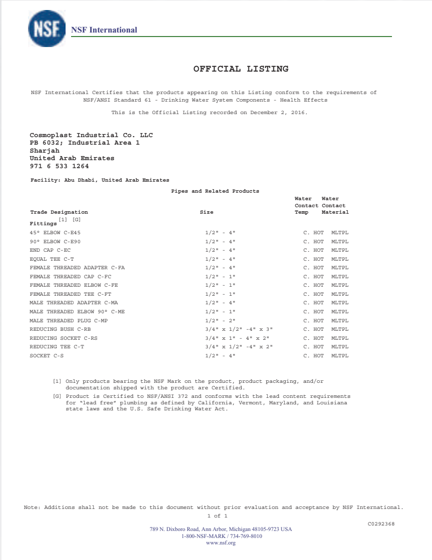
RECOGNIZES

Cosmoplast Industrial Co. LLC
United Arab Emirates

AS COMPLYING WITH NSF/ANSI 61 AND ALL APPLICABLE REQUIREMENTS. PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE AUTHORIZED TO BEAR THE NSF MARK.

December 2, 2016
Certificate C0292368 - 01

David Perkins
General Manager, Plumbing


NSF International

OFFICIAL LISTING

NSF International Certifies that the products appearing on this Listing conform to the requirements of NSF/ANSI Standard 61 - Drinking Water System Components - Health Effects

This is the Official Listing recorded on December 2, 2016.

Cosmoplast Industrial Co. LLC
PB 6032; Industrial Area 1
Sharjah
United Arab Emirates
971 6 533 1264

Facility: Abu Dhabi, United Arab Emirates

Pipes and Related Products

Trade Designation	Size	Water Contact Temp	Water Contact Material
Fittings [1] [G]			
45° ELBOW C-E45	1/2" - 4"	C. HOT	MLTPL
90° ELBOW C-E90	1/2" - 4"	C. HOT	MLTPL
END CAP C-EC	1/2" - 4"	C. HOT	MLTPL
EQUAL TEE C-T	1/2" - 4"	C. HOT	MLTPL
FEMALE THREADED ADAPTER C-FA	1/2" - 4"	C. HOT	MLTPL
FEMALE THREADED CAP C-FC	1/2" - 1"	C. HOT	MLTPL
FEMALE THREADED ELBOW C-FE	1/2" - 1"	C. HOT	MLTPL
FEMALE THREADED TEE C-FT	1/2" - 1"	C. HOT	MLTPL
MALE THREADED ADAPTER C-MA	1/2" - 4"	C. HOT	MLTPL
MALE THREADED ELBOW 90° C-ME	1/2" - 1"	C. HOT	MLTPL
MALE THREADED PLUG C-MP	1/2" - 2"	C. HOT	MLTPL
REDUCING BUSH C-RB	3/4" x 1/2" -4" x 3"	C. HOT	MLTPL
REDUCING SOCKET C-RS	3/4" x 1" - 4" x 2"	C. HOT	MLTPL
REDUCING TEE C-T	3/4" x 1/2" -4" x 2"	C. HOT	MLTPL
SOCKET C-S	1/2" - 4"	C. HOT	MLTPL

[1] Only products bearing the NSF Mark on the product, product packaging, and/or documentation shipped with the product are Certified.

[G] Product is Certified to NSF/ANSI 372 and conforms with the lead content requirements for "lead free" plumbing as defined by California, Vermont, Maryland, and Louisiana state laws and the U.S. Safe Drinking Water Act.

Note: Additions shall not be made to this document without prior evaluation and acceptance by NSF International.

1 of 1

C0292368

789 N. Dixboro Road, Ann Arbor, Michigan 48105-9723 USA
1-800-NSF-MARK / 734-769-8010
www.nsf.org


Approval Number: 1504528
Test Report: MAT/LAB 224J & 225J

WRAS APPROVED MATERIAL

Water Regulations Advisory Scheme Ltd.
Unit 13,
Willow Road,
Pen y Fan Industrial Estate,
Crumlin,
Gwent,
NP11 4EG

21st March 2018

Cosmoplast Industrial Company LLC
Branch of Abu Dhabi 1,
Abu Dhabi,
UAE

WATER REGULATIONS ADVISORY SCHEME LTD. (WRAS)
MATERIAL APPROVAL

The material referred to in this letter is suitable for contact with wholesome water for domestic purposes having met the requirements of BS6920-1:2000 and/or 2014 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

The reference relates solely to its effect on the quality of the water with which it may come into contact and does not signify the approval of its mechanical or physical properties for any use.

POLYVINYLCHLORIDE (PVC, PVC-U AND CPVC) - COMPONENTS - ONLY LEAD FREE PVC-U LISTED IN THIS SECTION. **5300**

'Cosmoplast D3 UPVC Pressure Pipe'. Grey coloured, extruded UPVC pipe. For use with water up to 65°C.

APPROVAL NUMBER: 1504528
APPROVAL HOLDER: COSMOPLAST INDUSTRIAL COMPANY LLC

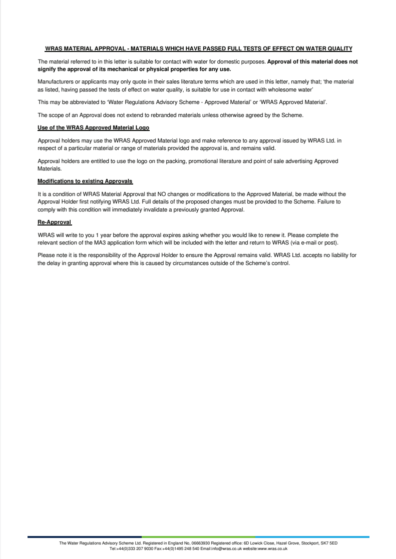
The Scheme reserves the right to review approval.
Approval 1504528 is valid between April 2015 and April 2020

An entry, as above, will accordingly be included in the Water Fittings Directory on-line under the section headed, "Materials which have passed full tests of effect on water quality".

The Directory may be found at: www.wras.co.uk/directory

Yours faithfully

Jason Furnival
Approvals & Enquiries Manager
Water Regulations Advisory Scheme


WRAS MATERIAL APPROVAL - MATERIALS WHICH HAVE PASSED FULL TESTS OF EFFECT ON WATER QUALITY

The material referred to in this letter is suitable for contact with water for domestic purposes. **Approval of this material does not signify the approval of its mechanical or physical properties for any use.**

Manufacturers or applicants may only quote in their sales literature terms which are used in this letter, namely that; 'the material as listed, having passed the tests of effect on water quality, is suitable for use in contact with wholesome water'

This may be abbreviated to 'Water Regulations Advisory Scheme - Approved Material' or 'WRAS Approved Material'.

The scope of an Approval does not extend to rebranded materials unless otherwise agreed by the Scheme.

Use of the WRAS Approved Material Logo

Approval holders may use the WRAS Approved Material logo and make reference to any approval issued by WRAS Ltd. in respect of a particular material or range of materials provided the approval is, and remains valid.

Approval holders are entitled to use the logo on the packing, promotional literature and point of sale advertising Approved Materials.

Modifications to existing Approvals

It is a condition of WRAS Material Approval that NO changes or modifications to the Approved Material, be made without the Approval Holder first notifying WRAS Ltd. Full details of the proposed changes must be provided to the Scheme. Failure to comply with this condition will immediately invalidate a previously granted Approval.

Re-Approval

WRAS will write to you 1 year before the approval expires asking whether you would like to renew it. Please complete the relevant section of the MA3 application form which will be included with the letter and return to WRAS (via e-mail or post).

Please note it is the responsibility of the Approval Holder to ensure the Approval remains valid. WRAS Ltd. accepts no liability for the delay in granting approval where this is caused by circumstances outside of the Scheme's control.


Exova

Test Witnessing Report

Description:	CPVC Pipe- 2" x 5.54mm SCH80		
Test Witnessed For:	Cosmoplast Industrial Company LLC		
Report Number:	A509236-01 Issue 1	Quote Ref:	AQ22403
Date of Testing:	14 December 2015	Date Reported:	27 December 2015

1.0 Introduction

2.0 Sample Selection, Preparation, Testing and Witnessing

3.0 Testing

Testing Properties	Test Method	Standard Requirement	Actual Results
Visual Inspection	ASTM F441-13		OK
Outside Diameter	ASTM F441-13		
Ovality	ASTM F441-13		
Wall Thickness	ASTM F441-13		
Burst pressure	ASTM D1599		Pass
Flattening	ASTM F441-13		Pass

Witnessed by: Fahad Ali

For and on authority of Exova Limited (Abu Dhabi)

Page 1 of 1


Exova

Test Witnessing Report

Description:	CPVC Pipe- 2" x 3.91mm SCH40		
Test Witnessed For:	Cosmoplast Industrial Company LLC		
Report Number:	A509236-02 Issue 1	Quote Ref:	AQ22403
Date of Testing:	14 December 2015	Date Reported:	27 December 2015

1.0 Introduction

2.0 Sample Selection, Preparation, Testing and Witnessing

3.0 Testing

Testing Properties	Test Method	Standard Requirement	Actual Results
Visual Inspection	ASTM F441-13		OK
Outside Diameter	ASTM F441-13		
Ovality	ASTM F441-13		
Wall Thickness	ASTM F441-13		
Burst pressure	ASTM D1599		Pass
Flattening	ASTM F441-13		Pass

Witnessed by: Fahad Ali

For and on authority of Exova Limited (Abu Dhabi)

Page 1 of 1

Inline with our product development programme, Cosmoplast reserves the right to modify or change any of the information contained herein without prior notice.

Other Plumbing Systems

Version 2, Issue 2 / April.2018

www.cosmoplast.com

Cosmoplast Plumbing Systems, A Division of Cosmoplast Industrial Co. LLC.

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Sales Off. Tel: +974 4 4582290 / 1
Fax: +974 4 4 4687886
Email: infoq@cosmoplastq.com

Email: pipeline@cosmoplast.com

www.harwal.net

A MEMBER OF Group HARWAL MANUFACTURING TECHNOLOGIES COMPANIES