

FLOWGUARD[®]
PIPE & FITTINGS

MANUFACTURED
IN NIGERIA BY **K** KARISHMA

Introduction to FlowGuard®

FlowGuard® CPVC Pipes and Fittings are the ideal choice for your hot and cold water piping solutions.

CPVC, known chemically as post-chlorinated polyvinyl chloride, is a specialty thermoplastic invented in 1959 by Lubrizol Advanced Materials, a wholly-owned subsidiary of Berkshire Hathaway. Since then, Lubrizol has invested decades of research and development into refining the CPVC technology used to produce today's **FlowGuard® Pipes and Fittings**.

The result of this is a piping system that is backed by major international agencies for being sustainable and safe, and is trusted by building professionals for its superior properties, a cost effective and easy installation process, and more than 55 years of successful service history.



Superior Properties

Physical Properties

Pipe Dimensions & Weights

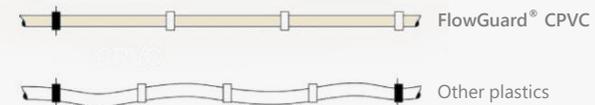
Outside Diameter (mm)	PN20 Wall Thickness (mm)	Weight (kg/m)
16	1.5	0.118
20	1.9	0.183
25	2.3	0.279
32	3.0	0.455
40	3.7	0.701
50	4.6	1.090

Pressure Rating

Temperature (°C)	PN20 Working Pressure (bar)
20	20
40	14
60	8
80	4
95	3

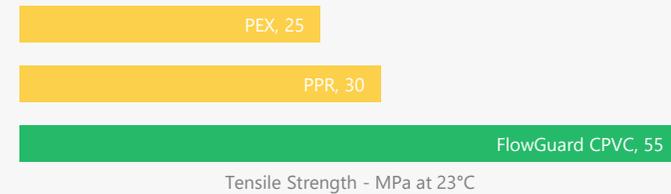
Tough and Rigid

FlowGuard® CPVC Pipes are tough and rigid, having a higher tensile strength than other thermoplastics used in plumbing applications. As a result they require fewer hangers and supports than other pipes, and still look more professional.



Tensile Strength

Tensile strength measures the force required to pull something to the point where it breaks. A higher value is better.

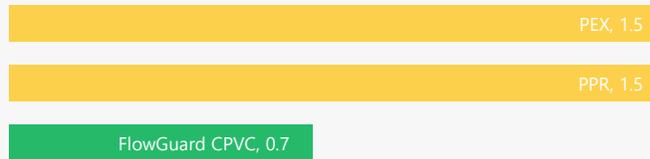


Superior Properties

Physical Properties

Coefficient of Thermal Expansion

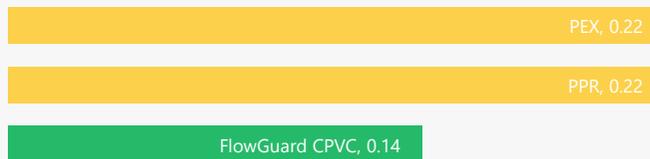
The coefficient of thermal expansion measures how the size of an object changes with a change in temperature. A lower value is better.



Coefficient of Thermal Expansion - $\times 10^{-4} K^{-1}$

Thermal Conductivity

Thermal conductivity measures how much heat an object absorbs i.e. how much heat is lost. A lower value is better.



Thermal Conductivity - W/MK

A Lower Cost of Ownership

As a result of its superior properties, **FlowGuard® CPVC Pipes** have a higher pressure bearing capability, with thinner pipe walls, than PPR or PEX pipes. This means that by using **FlowGuard® CPVC Pipes and Fittings** you will achieve a significantly higher water flow rate.

Outside Diameter (mm)	PN20 Wall Thickness (mm)		
	CPVC	PPR	PEX
20	1.9	3.4	2.8
25	2.3	4.2	3.5
32	3.0	5.4	4.4
40	3.7	6.7	5.5
50	4.6	8.4	6.9



A FlowGuard® CPVC pipe offers a water flow rate ~50% greater than a PPR pipe, and ~30% greater than a PEX pipe.

Chemical Resistance

FlowGuard® CPVC Pipes and Fittings are highly resistant to acids, alkalis, alcohols, and many other corrosive materials.

Particularly important for a potable water piping system, **FlowGuard® CPVC** is also highly resistant to chlorine.

When chlorine is added to water for disinfection, it transforms to hypochlorous acid. Hypochlorous acid is a strong oxidizer capable of breaking the carbon-to-carbon bonds of the polymer chain and thereby eroding most plastic piping systems.

FlowGuard® CPVC is *chlorinated*, which means its carbon chain is surrounded by large chlorine atoms that protect it from attack by the hypochlorous acid in the water.

However, the hydrogen atoms surrounding the carbon chain of polyolefins, such as PEX and PPR, are small atoms incapable of protecting the chain from attack by the hypochlorous acid in the water.

Case Study: Chlorine Resistance



FlowGuard® CPVC and PPR pipes were tested to demonstrate the effects of chlorinated water. After running chlorinated water through a PPR pipe for 7,000 hours using a low water flow rate of ~0.1 gpm, the pipe wall was significantly eroded. Meanwhile, there is no notable erosion of a **FlowGuard® CPVC** pipe wall and no decrease in hydrostatic performance even after 55 years of use.

Superior Properties

Antimicrobial Performance

FlowGuard® CPVC piping systems are approved to convey potable water in a wide range of countries around the world. This is because it has excellent chemical resistance, and can withstand salty and aggressive water conditions with variations in the PH value of water flowing through it.

FlowGuard® CPVC prevents electrolytic and galvanic corrosion, as well as the buildup of biofilm formation and scale, leading to water purity.

Health and Standards Associations

FlowGuard® CPVC Pipes and Fittings are approved for its water purity integrity by the following organizations across the world:

Country	Organization
USA	National Sanitation Foundation
UK	Water Regulations Advisory Scheme
Germany	Deutscher Verein des Gas-und Wasserfaches
France	Centre Scientifique et Technique du Batiment
Netherlands	KIWA
Canada	Canadian Standards Association

Superior Properties

Fire Performance

FlowGuard® CPVC falls under a fire classification of B s1 d0 – which is the best possible product fire classification for a non-metal product according to the EN 13501-1:2007+A1:2009 standard (*Fire classification of construction products and building elements*).

This means that in the event of a fire, **FlowGuard® CPVC** products will not contribute to the fire load or act as a catalyst for the fire to spread.

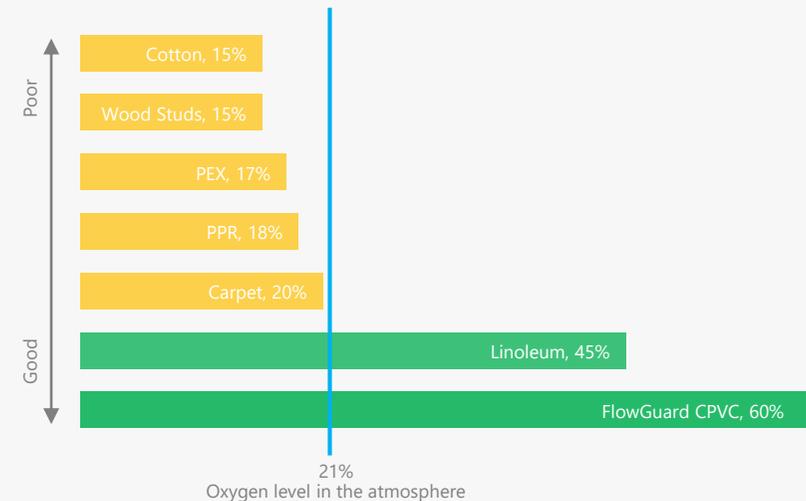
EN 13501-1:2007+A1:2009 Classification:

Fire behavior	: B	: Low flammability, no contribution to flashover
Smoke development	: s1	: Low smoke development
Flaming droplets	: d0	: No burning drops

Limiting Oxygen Index Comparison

The Limiting Oxygen Index (LOI) is the minimum concentration of oxygen, expressed in percentage, that is required in the atmosphere to support the combustion of a material.

The oxygen level in the atmosphere is ~21%, and **FlowGuard® CPVC** has a LOI of 60%, which means that in a normal atmosphere, CPVC will not support combustion and will not self-sustain a flame.



Superior Properties

UV Resistant

FlowGuard® CPVC is resistant to degradation from ultraviolet rays. It is safe to store and even install in direct sunlight, without any compromise to the system due to UV rays (at most there will be a slight cosmetic discoloration).

This is because the main degradation process for CPVC is dehydrochlorination, i.e. the removal of the large chlorine atoms that protect the polymer chain.

UV rays act as a strong catalyst for the oxidation process, which breaks down polymer chains protected by hydrogen atoms, such as those found in polyolefins like PPR and PEX pipes.

Eco Friendly

FlowGuard® CPVC was developed to be eco friendly and sustainable.

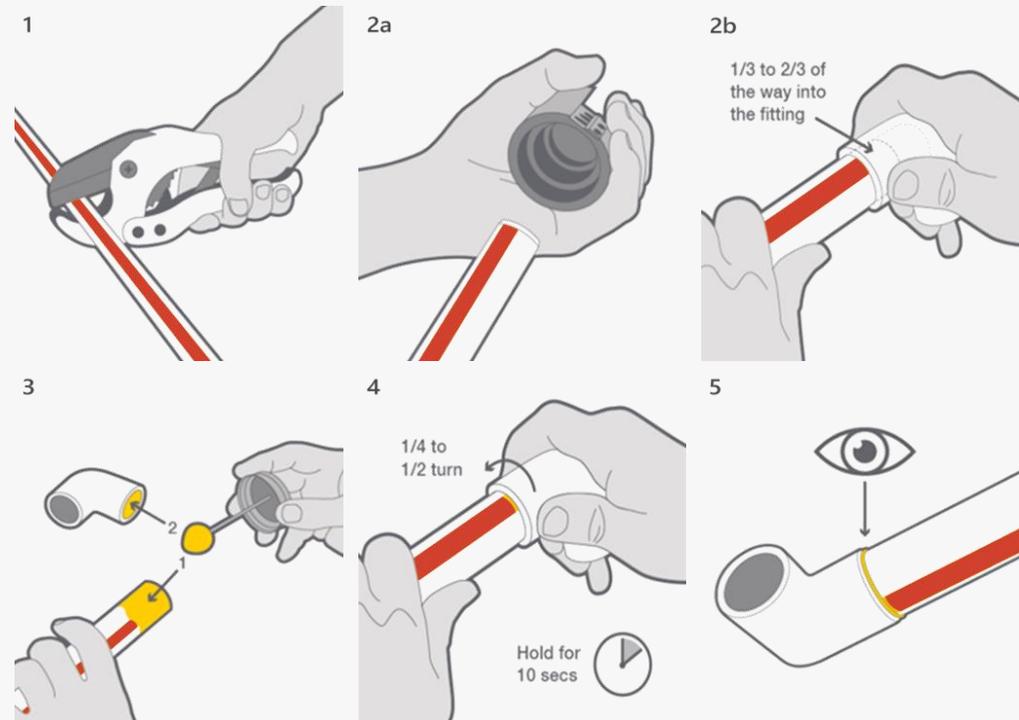
The power consumption to manufacture a CPVC product is lower than that of other plastic materials, due to a low petroleum content (CPVC is ~70% salt). Moreover, the smooth interior surface of **FlowGuard® CPVC Pipes and Fittings** lead to reduced friction loss, which means lower pumping requirements and less energy consumption.

Adding to that, CPVC material is easily recyclable, and so no waste is contributed to the environment.

Install with Ease

Installation Overview*

- 1) Cut the pipe to the desired length
- 2a) Use a chamfering tool to smoothen the end of the pipe
- 2b) Check the pipe enters $\frac{1}{3}$ to $\frac{2}{3}$ of the fitting, if it goes all the way in discard the fitting
- 3) Apply a heavy coat of CPVC solvent cement to the outside of the pipe end, and a light coat of CPVC solvent cement inside of the fitting
- 4) Insert the pipe into the fitting, rotating the pipe 90° to 180° to ensure proper distribution of the solvent cement, and hold for 10 seconds
- 5) Verify an even bead of solvent cement is visible around the joint to ensure system integrity



*Please refer to the installation guide for detailed installation instructions

Install with Confidence

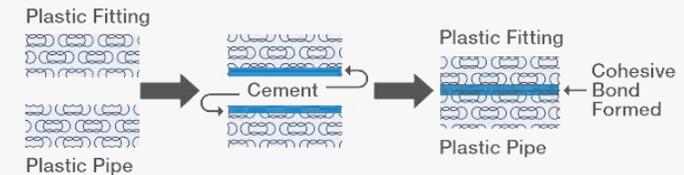
Solvent Cement System

FlowGuard® CPVC pipes and fittings are installed using a simple, long-lasting, and safe solvent cement system.

Unlike with other plumbing systems, there is no need for an electrical or gas source, special equipment, or expensive tools. The only working tools required are a pipe cutter and chamfering tool. Installation is also easy in tight and confined spaces.

A professional installation will assure worry-free operation for decades.

Solvent Cement Bonding Process



Plastic pipes and fittings are composed of large polymer molecules (illustrated by ). When solvent cement is applied to the plastic parts, the liquid penetrates the surface and softens the outer layer of the plastic part. The polymer chains then interpenetrate with one another to form a strong cohesive bond, effectively making the pipe and fitting function as a single component.

Standards

FlowGuard® CPVC Pipes and Fittings meet the following standards across the world:

Region	Standard	Description
International	ISO 10508	Plastic piping Systems for hot and cold water installations – Guidance for classification and design
	ISO 727	Dimensions of CPVC sockets
USA	ASTM-D2846	CPVC Hot and Cold Water Distribution Systems
	ASTM-F439	CPVC Schedule 80 CPVC Fittings
	ASTM-F441	CPVC Schedule 40 & 80 Pipe
Europe	EN ISO 15877	Plastic piping systems for Hot and Cold Water Installations Chlorinated poly(vinyl chloride) (PVC-C) – Part 1, 2, 4, 5, & 7
Germany	DIN 8079	CPVC pipe dimensions
	DIN 8080	CPVC pipe general quality requirements and testing
Saudi Arabia	SASO 5557-5558	Piping Systems for Hot and Cold Water Distribution
Kuwait	KSS 882 – 1998	CPVC Pipes used for water conduction network
Turkey	TSE-12182	Türk Standardi – Plastic piping systems for Hot & Cold Water (PVC-C)
India	IS 15778:2007	Chlorinated Polyvinyl Chloride (CPVC) pipes for potable hot and cold water distribution supplies
Nigeria	<i>To be developed</i>	

More Inside®

When you work with **FlowGuard® CPVC**, you get **More Inside®**. This starts with the unmatched research and development that goes into the CPVC compound to ensure a product with superior properties and an extending usage life.

More Inside® also gives you access to a wealth of technical expertise and services. Lubrizol has labs and technical facilities across the globe. Their technicians partner closely with processors throughout the manufacturing process, and their experts are readily available to provide insight and advice to clients on their projects.



A truly global footprint composed of 39 technical facilities, 82 manufacturing sites, and 57 sales support offices serving customers in over 100 countries.

A Trusted Producer

Get to know KARISHMA

Who We Are

KARISHMA is an established plastics manufacturer, having commenced operations fifteen years ago. Over time, we have come to be known for our uncompromising standard of quality in all our products, and this has facilitated the expansion of our distribution to cover the nation.

We produce PVC pipes, PVC conduit pipes, HDPE water storage tanks, and FlowGuard® CPVC Pipes.

Our Values

Integrity is at the heart of everything we do at KARISHMA. We have a set of guiding principles that we deeply believe in and follow without compromise. These values govern everything from how we produce and market our product, to the contributions we make in the community.

The core pillars around which these principles are based on are: to act responsibly and with respect; to aim high; and to be focused and perseverant towards achieving both individual and collective goals.

A Trusted Producer

Our Promise

We pledge to always act with integrity and respect, and to only manufacture the highest quality products for our customers.

Contact Us

Please visit us at karishma-ng.com, or contact us at info@karishma-ng.com to learn more.



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