VECTUS®

CPVC PIPES

Manufactured with
Japanese raw material

LIFELONG PLUMBING

Hot & Cold Water
Plumbing System that lasts a lifetime!

An ISO 9001:2008 Certified Company

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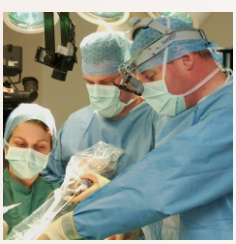
residential


commercial


schools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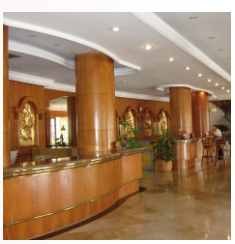
retail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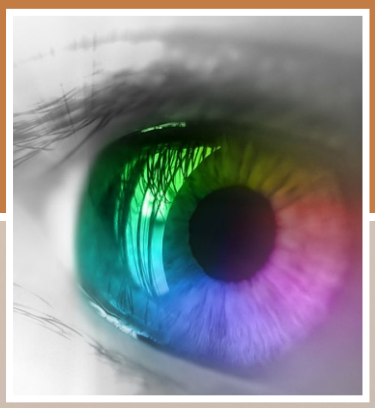


VISION

To enable the people of the society live a better life by providing world class products, while being careful not to harm the environment with any hazardous applications.

QUALITY POLICY

We, at Vectus Industries Limited are committed to manufacture quality plastic products with adherence to the world class standards. We will strive with team work spirit to maximize the customer satisfaction through continual improvement at all levels.

VECTUS®
CPVC PIPES

hot and cold water plumbing system for a lifetime

- **A chemically advanced formula for quality plus value**
- **Easy cutting in cold temperatures**
- **High impact resistance for better durability**
- **Freedom from corrosion for its lifetime**

Superior Performance

VECTUS CPVC from Vectus Industries Limited sets a tough new standard for performance in hot and cold water plumbing systems. With an advanced, new chemical formula, VECTUS CPVC solves many of the problems of both copper and conventional CPVC, while delivering exceptional value.

VECTUS CPVC is resistant to low-pH water, coastal salt air or corrosive soil. It also offers several other outstanding benefits:

- Permanent jointing with solvent-welded
- Cement fusing
- Full, unrestricted water flow
- Excellent heat retention
- Very quiet operation
- Extremely cost-effective pricing

On the jobsite and on the job, VECTUS offers builders and plumbers, the finest hot and cold water plumbing system on the market today.

Water is precious!
Do not waste water!

Tougher Than Copper

Copper plumbing has been used for decades despite several inherent problems. It is subject to the corrosion and pitting caused by harsh water. It does not meet NSF Standard 6I. And it also exhibits low heat retention, condensation, noisy operation and susceptibility to damage during installation. Finally, its price is quite volatile. Vectus CPVC solves each and every one of these problems.

Tougher Than PEX

Cross-linked polyethylene (PEX) is a relative newcomer to plumbing applications and it offers many advantages. But many PEX products are something of a compromise. They vary widely in compound formulation, processing methods and performance. These problems are caused primarily by unreliable raw materials and production technologies. Many PEX products also suffer from varying materials, multiple standards, building-code questions, expensive tools and confusing repair-and-assembly methods. But that's not all. Water flow may be restricted by insert fittings and tube I.D. Again, Vectus CPVC suffers none of these drawbacks.

More Impact Resistance - Fewer Installation Problems

Although conventional CPVC has a forty-year track record of reliable, trouble-free performance, it's not perfect. It is susceptible to damage during the installation process, especially when sustaining an impact of approximately seventeen foot-pounds or more. And even though conventional CPVC has a very high burst pressure, it is also more brittle, which can also result in damage.

Unfortunately, this damage is usually not discovered until the piping is pressure tested at inspection. And that means unnecessary delays and frustration for contractors.

Enter Vectus CPVC. Fabricated using a new, state-of-the-art chemical formulation, Vectus CPVC offers exceptional performance for more trouble-free installation.

Simply put, Vectus CPVC offers greater durability to withstand the knocks and blows that piping is often subjected to in the field. Just as important, it cuts more cleanly in cold temperatures.

Potable water - our most precious commodity

Potable water is one of the best controlled commodity goods.

The supply system should influence the water on its way up to the taps as little as possible. Choosing the right domestic water pipe system and its material is of decisive importance.

Vectus CPVC Pipe Systems are suitable for all different qualities of potable water.

The environmentally friendly and hygienically enhanced potable water pipe system made by Vectus is physiologically and microbiologically harmless. The technical suitability of Vectus CPVC Pipe System has been evident all over.

Ecology

Environmental protection is taken seriously by Vectus.

Products such as Vectus CPVC pipe system feature not only a long service life, but also excellent environmental and social compatibility.

Since its inception, Vectus has always placed emphasis on the fact that its products and manufacturing processes should not pollute our sensitive ecosystems, and ensured development of fully recyclable materials which can thus be added, problem-free, to new production.

Vectus CPVC pipe system fulfil ecological standards which are demanded today.

Vectus has always emphasized on its philosophy, that ecological and economic interests should not be contradictory, neither during production and sales, nor in the application of product.

The environmentally friendly raw material is used for the manufacture of Vectus pipe system. To ensure its environmental compatibility, all contained additives (colour pigments and stabilizers) are extensively tested, not only by Vectus's own laboratory, but also by prominent independent laboratories.

Prime ecological advantages

- The additive share of the Vectus material is below 3%
- Free from heavy metals that are hazardous to health (e.g. copper, lead, nitrogen etc.)
- Longevity
- Recyclable
- Hygienic Suitability

According to DIN 1988 T2 all installation parts coming directly in contact with potable water are commodity goods according to the spirit of the Law for Food and Commodity Goods. Plastic pipes have to comply with the KTW-recommendations of the Federal Public Health Department.

Specifications

Vectus CPVC pipes are produced in copper tube size (cts) ranging from 15 mm ½" to 50 mm 2" with two different standard dimensional ratio namely SDR 11 and SDR 13.5.The fittings are produced as per SDR 11, irrespective of standards,the raw material cpvc compound is same for all standards. Even though having the same physical properties SDR 11 and SDR 13.5 have different wall thickness, at any given temperature have different pressure rating as follows:

Pipe	Temperature (oC)	Pressure Rating (PSI)	(kg/cm2)
SDR 11	23	400	28.1
	82	100	7.0
SDR 13.5	23	320	22.5
	82	80	5.6

Applications of Vectus CPVC Pipe System

Vectus CPVC pipe system is ideal for hot and cold water applications in homes, apartments, hotels, resorts, industries, schools, hospitals, high rise buildings, independent villas, commercial complexes, to ensure purity of water in hygienic conditions. In fact anywhere there is requirement for clean hot and cold water!

RESIDENTIAL

COMMERCIAL

HIGH RISE BUILDINGS

INDUSTRY

RETAIL

HOSPITALS

SCHOOLS

HOTELS

Advantages of Vectus CPVC Pipe System

Extraordinary Safety and Hygiene

- Exceptional all weather corrosion resistance even against harshest of water conditions and most acids and alkalis
- Resistant to scaling and pitting
- Resistant to chlorine normally used to treat water in India
- No electrolytic corrosion
- Tough, rigid material withstands field abuses and requires minimum anchorage/supports
- High temperature and pressure bearing capacity maintained throughout life
- Lowest bacterial growth compared to any other plumbing system.
- Self-extinguishing in case of fire
- Low smoke generation
- Negligible leaching of foreign particles into water ensuring unaffected water quality
- Does not require electricity or welding torch during installation eliminating risk of fire or accidents on site.

Lifelong Plumbing

- Smooth bore and 100% water carrying capacity over life due to no depositions
- Low thermal expansion than any alternate plastic system
- Very low thermal conductivity ensures hot water remains hot.
- Very low noise due to reduced water hammer problems
- High impact strength even in low temperature conditions
- Can be installed and operated in all weather conditions
- Pressure and temperature bearing capacity remains unaffected even after long solar and UV radiation exposure.

Enormous Cost Savings

- Low initial investment & Lowest possible lifetime ownership cost
- Very high energy efficiency due to insulating properties
- Easy and considerably fast installation even in tight, cramped places requiring minor investment in tools
- Long term price stability
- Adds to homes resale value in addition to better realization for builders
- 100% recyclable material having added environmental benefit
- Similar flow and pressure rating with smaller pipe size compared to alternate systems

Features and Benefits

Corrosion resistance:
Vectus CPVC Pipe gives excellent resistance even under the harshest of water conditions so there are none of the purity worries from corrosion of metal pipe or soldered joints. Vectus CPVC Pipe keeps pure water pure.

Lower bacterial growth:
Bacteria build up with CPVC is far lower than with alternative piping materials - Copper, Steel and other thermoplastics.

Tough, rigid material:
Vectus CPVC pipe has a much higher strength than other thermoplastics used in plumbing. This means that CPVC needs less hangers and supports and there is no unsightly looping of the pipe. Vectus CPVC pipe has a higher pressure bearing capability. This leads to the same flow rate with a smaller pipe size.

No Scale, pit or leach formation
Even after years of use in the most aggressive conditions, Vectus CPVC pipe won't corrode, standing up to low pH water, coastal salt air exposures and corrosive soils. Vectus CPVC Pipe stays as solid and reliable as the day it was installed. It maintains full water carrying capacity because its scale resistance means no build up to cause water pressure loss.

Unaffected by chlorine in the water:
Some materials may be adversely affected by chlorine contained in the water supply, which can cause breakdown of the polymer chains and potential leaks. In this respect, Vectus CPVC pipe is unaffected by the chlorine present in potable water supply.

Chemical resistance:
CPVC has excellent chemical resistance to strong mineral acids and bases.

Low thermal expansion:
Vectus CPVC pipe has a lower coefficient of thermal expansion than alternative plastics, reducing the amount that the pipe expands when hot water is running, again reducing unsightly 'looping' of the pipe.

Easy, cold welding process:
CPVC uses a simple, solvent cement jointing method. Tools required are very simple and inexpensive (chamfering tool and pipe cutter only) and avoid the need for an electrical source.

Superior insulation:
Vectus CPVC pipe is more energy efficient than metal pipe. As an insulator it does not lose heat the way metal pipe do. Heat loss and thermal expansion are reduced.

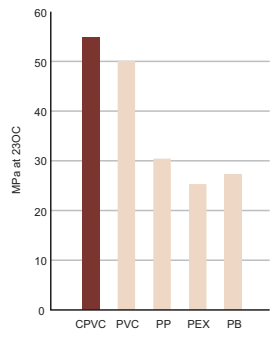
Hot and Cold water compatible:
Vectus CPVC pipe is compatible with both hot and cold water. It withstand very high temperature compared to any other thermoplastic plumbing systems. Many solar and electric water heaters have CPVC piping system for heat efficiency and lower installation cost.

Fire safety:
CPVC has a limiting Oxygen Index (LOI) of 60. Thus in air, Vectus CPVC pipe does not support combustion. No flaming drips, does not increase the fire load, low flame spread, low smoke generation.

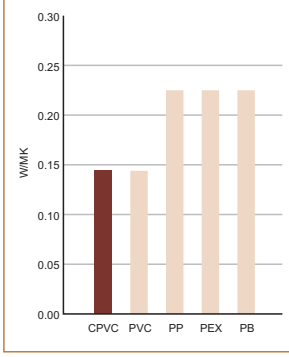
Approved world wide:
CPVC plumbing system is approved for contact with potable water in wide range of countries including USA, UK, Canada, Germany, France, The Netherlands, Middle East among others. Here in India, Vectus CPVC plumbing system is approved by BMC and CPWD for potable water supply.

Cost effective:
CPVC Plumbing System is very cost effective than any other plumbing systems. It saves cost on fittings, loops, anchors, offsets, insulation, labour and expensive tools. More over CPVC plumbing systems last longer more than 50 years.

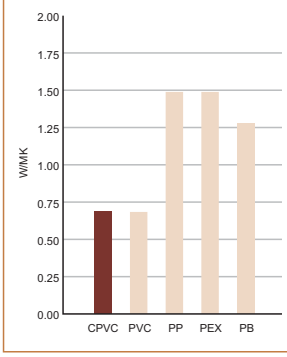
TENSILE STRENGTH

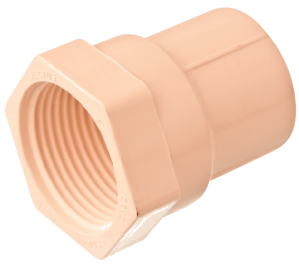


THERMAL CONDUCTIVITY



COEFFICIENT OF THERMAL EXPANSION





Since its inception, Vectus has been driven by two key objectives. The first, to deliver innovative, long lasting and international quality piping systems to the society and help the people live a life that is healthier, hassle-free and contemporary. To achieve this, Vectus has always followed a strict quality policy. Be it the sourcing of raw materials, manufacturing standards or the end product, the route has always been untarnished.

The second objective, which is equally important for Vectus as a responsible corporate citizen caters to our environment. With issues like global warming and environmental imbalance threatening our very existence, Vectus is doing everything in its capacity to manufacture products that are eco-friendly and pose no threat to our beloved nature.

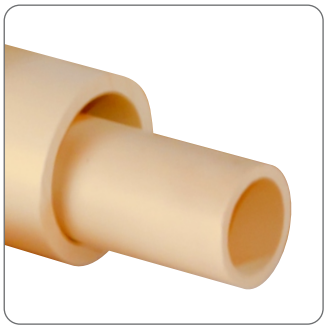
...for generations ahead

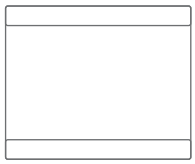
Basic Physical Properties

PROPERTY	TEST	CONDITION	SI UNITS
GENERAL			
• Specific Gravity	ASTM D792	23°C	1.55 g/cm3
• Specific Volume		23°C	0.645 cm3 /g
• Water Absorption	ASTM D570	23°C	0.0003
		100°C	0.0055
• Rockwell Hardness	ASTM D785	23°C	
• Cell class	ASTM D1784		
MECHANICAL			
• Izod Impact	ASTM D256	23°C	80 J/m o.n.
• Tensile Strength	ASTM D638	23°C	55 N/mm2
• Tensile Modulus	ASTM D638	23°C	2500 N/mm2
• Flexural Strength	ASTM D790	23°C	104 N/mm2
• Flexural Modulus	ASTM D790	23°C	2860 N/mm2
• Compressive Strength	ASTM D695	23°C	70 N/mm2
• Compressive Modulus	ASTM D695	23°C	1350 N/mm2
THERMAL			
• Coefficient of Thermal Expansion	ASTM D696		6.3x105 m/m/°K
• Thermal Conductivity	ASTM C177		0.14 Wm/°K/m2
• Heat Distortion Temperature	ASTM D638		103°C
• Heat Capacity	DSC	23°C	0.90 J/g°K
		100°C	1.10 J/g°K
FLAMMABILITY			
• Flammability Rating	UL 94	0.157 cm	
• Flame Spread	ASTM E84		V-0, 5VB, 5VA
• Smoke Developed	ASTM E84		15
• Limiting Oxygen Index	ASTM D2863		70-125
			0.6
ELECTRICAL			
• Dielectric Strength	ASTM D147		492,000 V/cm
• Dielectric Constant	ASTM D150	60 Hz, 30°F/-1°C	3.7
• Power Factor	ASTM D150	1000 Hz	0.00007
• Volume Resistivity	ASTM D257	23°C	3.4x10'5 ohm/cm

PRODUCT RANGE - VECTUS CPVC PIPES & FITTINGS

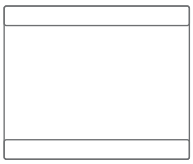
CPVC PIPE - SDR 11





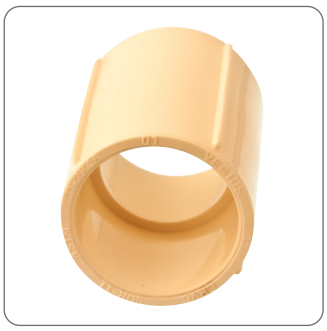
Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

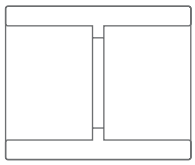
CPVC PIPE - SDR 13.5



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

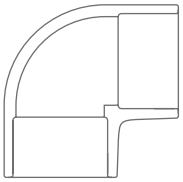
COUPLER





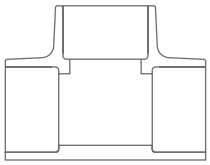
Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

ELBOW 90°



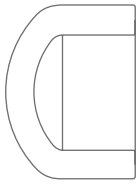
Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

TEE



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

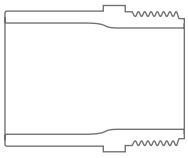
END CAP



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

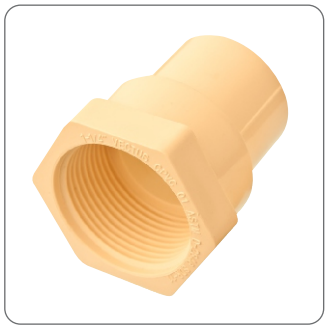
PRODUCT RANGE - VECTUS CPVC PIPES & FITTINGS

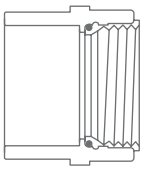
MALE ADAPTER PLASTIC THREADED



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

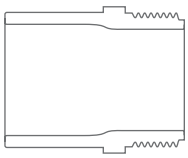
FEMALE ADAPTER PLASTIC THREADED





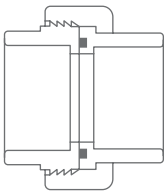
Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

REDUCING MALE ADAPTER PLASTIC THREADED



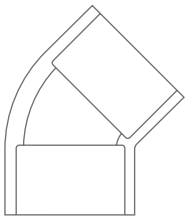
Size (Inches)	¾ x ½
Nominal Size (mm)	20 x 15

UNION



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

ELBOW 45°

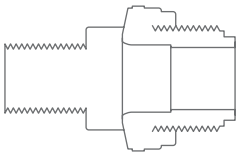


Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

STEP OVER BEND

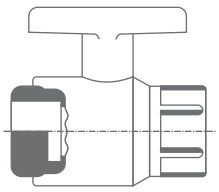
Size (Inches)	½	¾	1
Nominal Size (mm)	15	20	25

TANK ADAPTER



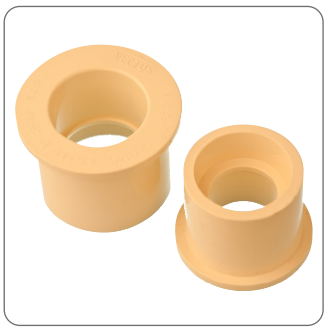
Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

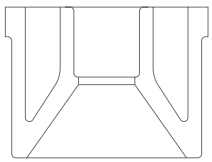
BALL VALVE



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

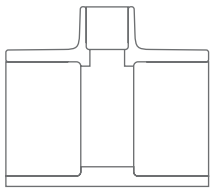
BUSHING





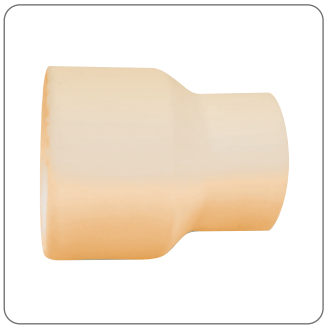
Size (Inches)	Nominal Size (mm)
¾ x ½	20 x 15
1 x ½	25 x15
1 x ¾	25 x20
1¼ x ½	32 x15
1¼ x ¾	32 x 20
1¼ x 1	32 x 25
1½ x ½	40 x 15
1½ x ¾	40 x 20
1½ x 1	40 x 25
1½ x 1¼	40 x 32
2 x ½	50 x 15
2 x ¾	50 x 20
2 x 1	50 x 25
2 x 1¼	50 x 32
2 x 1½	50 x 40

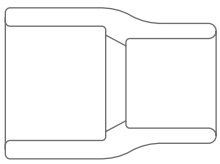
REDUCER TEE



Size (Inches)	Nominal Size (mm)
½ x ¾ x ½	15 X 20 X15
½ x ½ x ¾	15 X 15 X20
¾ x ½ x ¾	20 X 15 X20
¾ x ¾ x ½	20 X 20 X 15
1 x ½ x 1	25 X15 X25
1 x ¾ x 1	25 X 20 X25
1¼ x ½ x 1¼	32 X 15 X32
1¼ x ¾ x 1¼	32 X 20 X 32
1¼ x 1 x 1¼	32 X 25 X32
1¼ x 1½ x 1¼	32 X 40 X32
1½ x ½ x 1½	40 X15 X40
1½ x ¾ x 1½	40 X20 X40
1½ x 1 x 1½	40 X25 X40
1½ x 1¼ x 1½	40 X32 X40
2 x ½ x 2	50 X15 X50
2 x ¾ x 2	50 X20 X50
2 x 1 x 2	50 X25 X50
2 x 1¼ x 2	50 X32 X50
2 x 1½ x 2	50 X40 X50

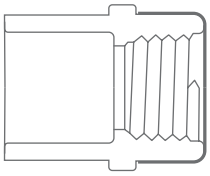
REDUCER COUPLER





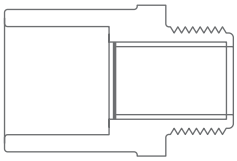
Size (Inches)	¾ x ½	1 x ½	1 x ¾	1¼ x ¾	1¼ x 1	1½ x ¾	2 x ¾
Nominal Size (mm)	20 x 15	25 x 15	25 x 20	32 x 20	32 x 25	40 x 20	50 x 20

FEMALE ADAPTER BRASS THREADED



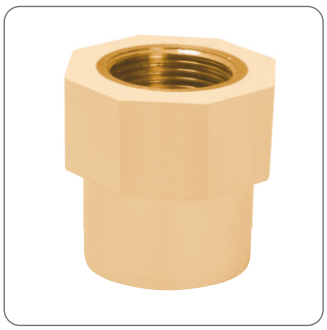
Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

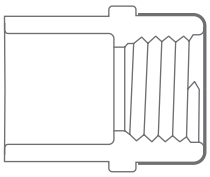
MALE ADAPTER BRASS THREADED



Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

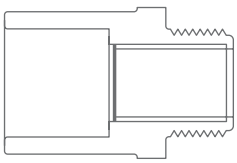
REDUCING FEMALE ADAPTER BRASS THREADED





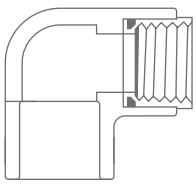
Size (Inches)	¾ x ½	1 x ½
Nominal Size (mm)	20 x 15	25 x 15

REDUCING MALE ADAPTER BRASS THREADED



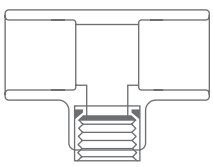
Size (Inches)	¾ x ½	1 x ½
Nominal Size (mm)	20 x 15	25 x 15

ELBOW 90° BRASS



Size (Inches)	Nominal Size (mm)
½ x ½	15 x 15
¾ x ½	20 x15
¾ x ¾	20 x20
1 x ½	25 x15
1 x ¾	25 x 20
1 x 1	25 x 25
1¼ x 1¼	32 x 32

TEE BRASS



Size (Inches)	Nominal Size (mm)
¾ x ½ x ¾	20 x 15 x 20
1 x ½ x 1	25 x 15 x 25
1 x 1 x 1	25 x 25 x 25

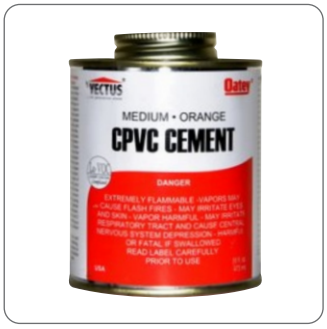
LONG THREAD PLUG

Size (Inches)	½
Nominal Size (mm)	15

POWDER COATED METAL CLAMP

Size (Inches)	½	¾	1	1¼	1½	2
Nominal Size (mm)	15	20	25	32	40	50

CPVC SOLVENT CEMENT



Size (Ounces)	Size (ml.)
1	29.5
2	59.0
4	118.0
8	237.0
16	473.0

Technical Details

Outside Diameters and Wall Thicknesses for CPVC SDR 11 Plastic Pipe

Nominal Size		Outside Diameter (mm)		Wall Thickness (mm)		Pressure Rating - PSI (kg/cm²)			
(in)	(mm)	Average	Tolerance	Minimum	Tolerance	73.4°F	23°C	180°F	82°C
½"	(15)	0.625 (15.9)	±0.003 (0.08)	0.068 (1.73)	+0.020 (0.51)	400	(28.1)	100	(7.0)
¾"	(20)	0.875 (22.2)	±0.003 (0.08)	0.080 (2.03)	+0.020 (0.51)	400	(28.1)	100	(7.0)
1"	(25)	1.125 (28.6)	±0.003 (0.08)	0.102 (2.59)	+0.020 (0.51)	400	(28.1)	100	(7.0)
1¼"	(32)	1.375 (34.9)	±0.003 (0.08)	0.125 (3.18)	+0.020 (0.51)	400	(28.1)	100	(7.0)
1½"	(40)	1.625 (41.3)	±0.004 (0.10)	0.148 (3.76)	+0.020 (0.51)	400	(28.1)	100	(7.0)
2"	(50)	2.125 (54.0)	±0.004 (0.10)	0.193 (4.90)	+0.023 (0.58)	400	(28.1)	100	(7.0)

* For ½" wall thickness minimum is not a function of SDR.

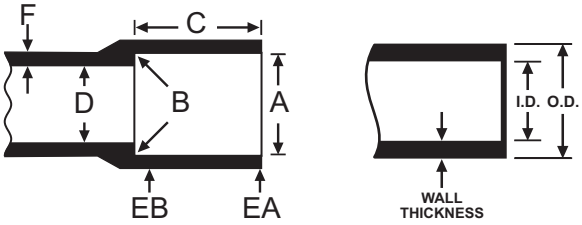
Outside Diameters and Wall Thicknesses For CPVC SDR 13.5 Plastic Pipe

Nominal Size		Outside Diameter (mm)		Wall Thickness (mm)		Pressure Rating - PSI (kg/cm²)			
(in)	(mm)	Average	Tolerance	Minimum	Tolerance	73.4°F	23°C	180°F	82°C
½"	(15)	0.625 (15.9)	±0.003 (0.08)	0.055 (1.40)	+0.020 (0.51)	320	(22.5)	80	(5.6)
¾"	(20)	0.875 (22.2)	±0.003 (0.08)	0.065 (1.65)	+0.020 (0.51)	320	(22.5)	80	(5.6)
1"	(25)	1.125 (28.6)	±0.003 (0.08)	0.083 (2.12)	+0.020 (0.51)	320	(22.5)	80	(5.6)
1¼″	(32)	1.375 (34.9)	±0.003 (0.08)	0.102 (2.59)	+0.020 (0.51)	320	(22.5)	80	(5.6)
1½"	(40) '	1.625 (41.3)	±0.004 (0.10)	0.120 (3.06)	+0.020 (0.51)	320	(22.5)	80	(5.6)
2"	(50)	2.125 (54.0)	±0.004 (0.10)	0.157 (4.00)	+0.023 (0.58)	320	(22.5)	80	(5.6)

* For ½" wall thickness minimum is not a function of SDR.

Technical Details

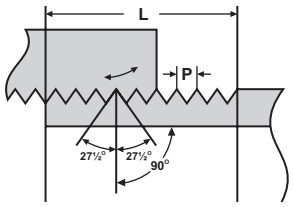
Tapered Socket Dimensions for CPVC SDR 11, Plastic Pipe Fittings



Nominal Size (in.)	Socket Entrance Diameter		Socket Bottom Diameter		Socket Length	Inside Diameter	Wall Thickness		
	'A' Average	'A' Tolerance	'B' Average	'B' Tolerance	'C' min.	'D' min.	Entrance 'EA' min.	Bottom 'EB' min.	'F'
½ (3.25)	0.633 (16.08)	±0.003 (0.08)	0.619 (15.72)	±0.003 (0.08)	0.500 (12.70)	0.489 (12.42)	0.068 (1.73)	0.102 (2.59)	0.128
¾ (3.25)	0.884 (22.45)	±0.003 (0.06)	0.870 (22.10)	±0.003 (0.08)	0.700 (17.78)	0.715 (18.16)	0.080 (2.03)	0.102 (2.59)	0.128
1 (3.25)	1.135 (28.83)	±0.003 (0.08)	1.121 (28.47)	±0.003 (0.08)	0.900 (22.86)	0.921 (23.39)	0.102 (2.59)	0.102 (2.59)	0.128
1¼	1.386 (35.20)	±0.003 (0.08)	1.372 (34.85)	±0.003 (0.08)	1.100 (27.94)	1.125 (28.58)	0.125 (3.18)	0.125 (3.18)	0.156

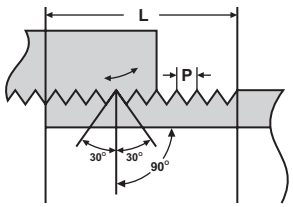
American National Standard Taper Pipe Threads (NPT)
ANSI Standard B1.20.1; ASTM Standard F1498

Nominal Size (in)	(mm)	Threads per inch	Effective Thread Length (L)	Pitch of Thread (P)
½	15	14	0.5337	0.07143
¾	20	14	0.5457	0.07143
1	25	11½	0.6828	0.08696
1¼	32	11½	0.7068	0.8696
1½	40	11½	0.7235	0.8696
2	50	11½	0.7565	0.8696



BSP ISO 7/1 Parallel Threads

Nominal Size (in)	(mm)	Threads per inch	Effective Thread Length (L)	Pitch of Thread (P)
½	15	14	13.152	1.8143
¾	20	14	14.514	1.8143
1	25	11	16.714	2.3091
1¼	32	11	19.050	2.3091
1½	40	11	19.050	2.3091
2	50	11	23.378	2.3091



Thermal Expansion and Contraction

Like all piping material, Vectus CPVC expand when heated and contract when cooled. CPVC piping (regardless of pipe diameter) will expand about 1 inch per 50 feet of length when subjected to a 50°F temperature increase, therefore, allowances must be made for this resulting movement.

However, laboratory testing and installation experience have demonstrated that the practical issues are much smaller than the coefficient of thermal expansion would suggest. The stresses developed in CPVC pipe are generally much smaller than those developed in metal pipe for equal temperature changes because of the difference in elastic modulus.

Required loops are smaller than those recommended by the Copper Development Association for copper systems.

Expansion is mainly a concern in hot water lines. Generally, thermal expansion can be accommodated with changes in direction. However, a long straight run may require an offset or loop. Only one expansion loop, properly sized is required in any single straight run, regardless of its total length. If more convenient, two or more smaller expansion loops, property sized, can be utilized in a single run of pipe to accommodate the thermal movement.

Be sure to hang pipe with smooth straps that will not restrict movement. For convenience, loop (or offset) length have been calculated for different pipe sizes and different run length with a temperature increase DT) of about 80°F.

The results, shown in Tables A, are presented simply as a handy guide for quick and easy determinations of acceptable loop length for the approximate conditions.

TABLE A

Vectus CPVC CTS Pipes (ASTM D2846)
Calculated Loop (Offset) Length with ΔT of approximately 80°F (Length of run in feet)

Nominal Pipe Size	Loop Length (L) in inches			
	40	60	80	100
½	22	27	31	34
¾	26	32	36	41
1	29	36	41	46
1¼	32	40	46	51
1½	35	43	50	56
2	40	49	57	64

Loop length for other temperatures and run length can be calculated utilizing the following equations :

Expansion Loop Formula

$$L = \sqrt{\frac{3\,ED\,(\Delta L)}{2S}}$$

where:

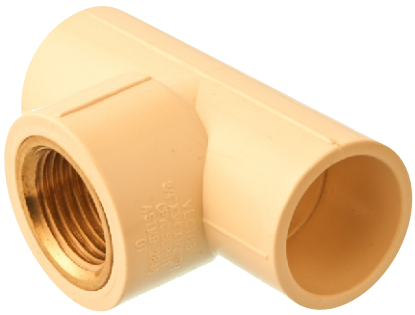
L = Loop length (in.)
E = Modulus of elasticity at maximum temperature (psi)
S = Working Stress at maximum temperature (psi)
D = Outside diameter of pipe (in.)
ΔL = Change in length due to change in temperature (in.) (see formula below)

Thermal Expansion Formula

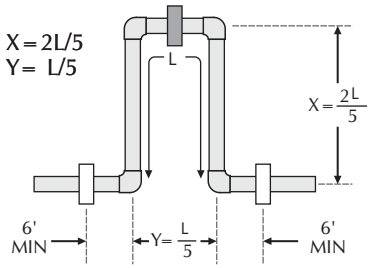
$$\Delta L = Lp\ C\ \Delta T$$

where:

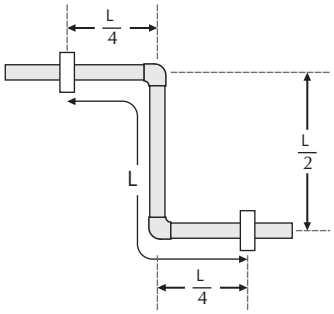
ΔL= Change in length due to change in temperature (in.)
Lp = Length of pipe (in.)
C = Coefficient of thermal expansion (in. / in. / OF)
= 3.4 x 10-5 in. / in. / OF for CPVC
ΔT = Change in temperature (OF)



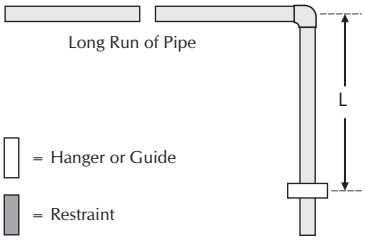
Loop



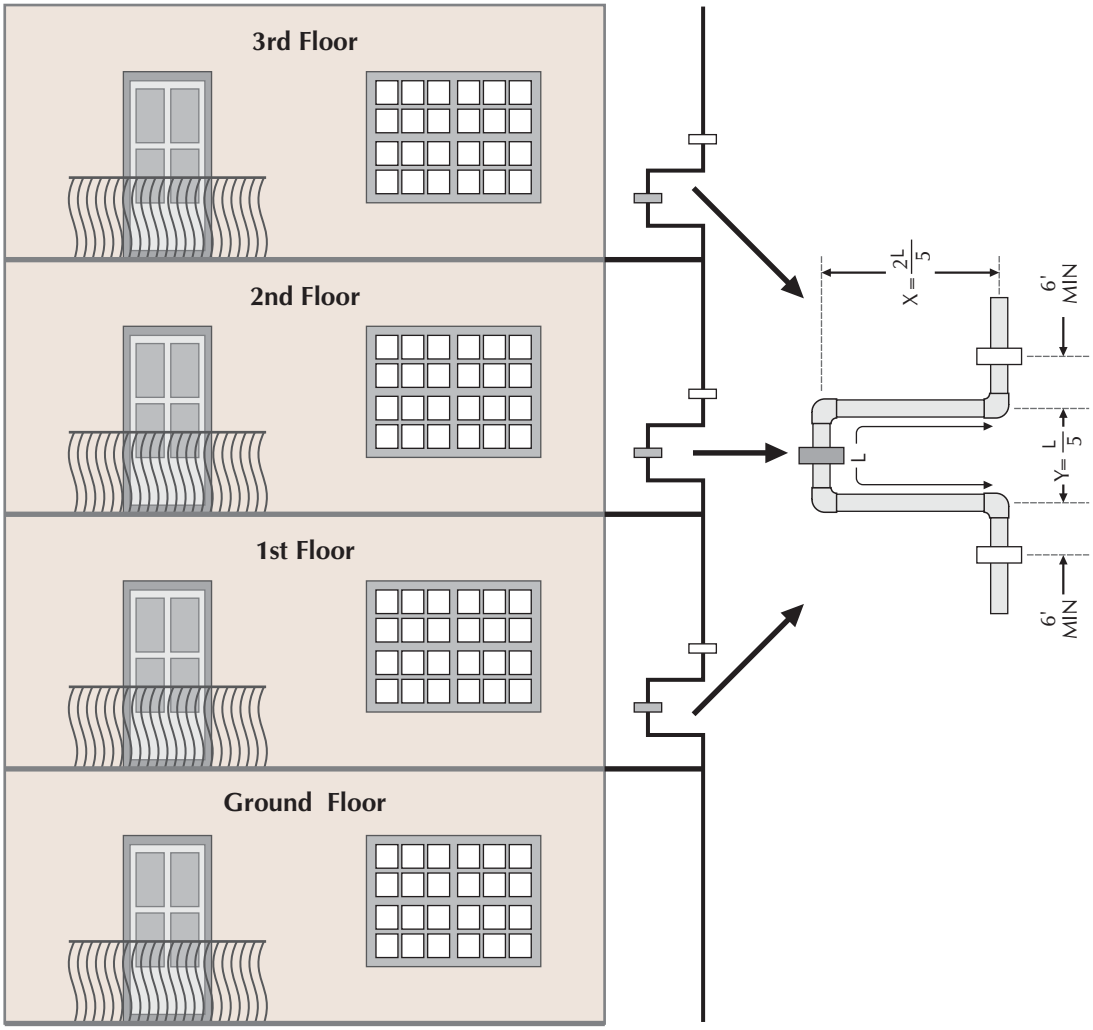
Offset



Change of Direction



Do not butt-up against fixed structure (joist, stud or wall)



Horizontal and Vertical Support

Horizontal & Vertical runs of Vectus CPVC Pipe should be supported by pipe clamps or by hangers located on the horizontal connection close to the riser hangers should not have rough or sharp edges, which come in contact with the pipe.

Horizontal & Vertical Support - Spacing

Nominal Pipe Size (in)	(mm)	21°C (70°F)		49°C (120°F)		71°C (160°F)		82°C (180°F)	
½	(15)	5.5	(167.70)	4.5	(137.16)	3.0	(91.44)	2.5	(76.20)
¾	(20)	5.5	(167.70)	5.0	(152.40)	3.0	(91.44)	2.5	(76.20)
1	(25)	6.0	(182.88)	5.5	(167.70)	3.5	(106.68)	3.5	(91.44)
1¼	(32)	6.5	(198.12)	6.0	(182.88)	3.5	(106.68)	3.5	(106.68)
1½	(40)	7.0	(213.36)	6.0	(182.88)	3.5	(106.68)	3.5	(106.68)
2	(50)	7.0	(213.36)	6.5	(198.12)	4.0	(121.92)	3.5	(106.68)

Transition Fittings and Joints

Special transition fittings or joints are used whenever CPVC piping is connected to a metal valve, fittings, or other appurtenance such as a filter, or to parts made of another plastic. These special transition fittings can have many forms. One common form is the true union with a metal end and a CPVC end held together with a plastic or metal gland nut and having an elastomeric seal between them. Other forms are the flanged joint, the grooved joint, insert molded metal in CPVC fittings, patented push-on type fittings and finally the CPVC female threaded adapter with an elastomeric seal at the bottom of the thread. The later fittings are designed so that they have no thread interference and rely entirely on the elastomeric seal for water tightness. They require only minimal torque to attain an adequate seal.

Standard compression fittings which utilize brass of plastic ferrules can be used to assemble CPVC. However, Teflon® tape should be applied over the brass ferrule to compensate for the dissimilar thermal expansion rates of the brass and CPVC that could possibly otherwise result in a leak. Care should be taken not to over-torque the compression connection.

Metal fittings with CPVC socket inserts are also available. The tubing is cemented directly into the socket in the same way as an all-CPVC fittings.

The standard practice is to thread a male thread adapter into the female threaded part, such as a valve of stop, and then solvent cement to the CPVC pipe. However, when using the male thread adapter, there are two limitations that the installer must consider when deciding where and how to use it. First, the male thread adapter may develop a drip leak if the joint is subjected to too broad temperature range. And second, some thread sealants intended to minimize leak problems may chemically attack the CPVC and cause stress cracking of the adapter (see Thread Sealants section). The preferred method of transitioning between metal and CPVC plumbing component is to use an insert molded metal-in-CPVC fitting or true union with a metal and a CPVC end.

Underground Installation

CPVC pipes and fittings can be installed underground. Since these piping systems are flexible systems, proper attention should be given to the conditions you create to bury these pipes. The stiffness of the piping system is affected by sidewall support, soil compaction, and the condition of the trench. Trench bottoms should be smooth and regular in either undisturbed soil or a layer of compacted backfill. Pipe must lie evenly on this surface throughout the entire length of its barrel. Excavation, bedding and backfill should be in accordance with the provision of the local plumbing code.

Trenching

The following trenching and burial procedures should be used to protect the piping system.

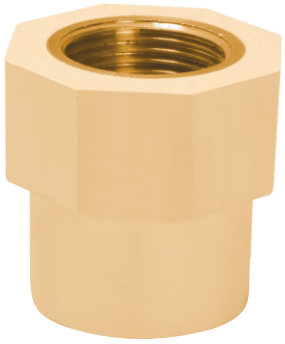
1. Excavate a trench which ensures that the sides will be stable under all working conditions.
2. The trench should be wide enough to provide adequate room for the following:
   i) Joining the pipe in the trench.
   ii) Snaking the pipe from side or side to compensate for expansion and contraction.
   iii) Filling and compacting the side fills.

The space between the pipe and trench wall must be wider than the compaction equipment used in the compaction of the backfill. Minimum width should not be less than the greater of either the pipe outside diameter plus 16 inches or the pipe outside diameter times 1.25 plus 12 inches. Trench width may be different if approved by the design engineer.

3. The trench bottom should be smooth, free of rocks and debris, continuous, and provide uniform support. If ledge rock, hardpan or large boulders are encountered, the trench bottom should be padded with bedding of compacted granular material to a thickness of at least 4 inches. Foundation bedding should be installed as required by the engineer.
4. Trench depth is determined by the pipe's service requirements. Plastic pipe should always be installed at least below the frost level. The minimum cover for lines subject to heavy overhead traffic is 24 inches.
5. A smooth trench bottom is necessary to support the pipe over its entire length on firm stable material. Blocking should not be used to change pipe grade or to intermittently support pipe over low sections in the trench.

Bedding and Backfilling

1. Even though sub-soil conditions vary widely from place to place, the pipe backfill should be stable and provide protection for the pipe.
2. The pipe should be surrounded with a granular material which is easily worked around the sides of I the pipe Backfilling should be performed in layer of 6 inch with each layer being sufficiently! compacted to 85% to 95% compaction.
3. A mechanical tamper is recommended for compacting sand and gravel backfill which contain a| significant proportion of fine grained material, such as silt and clay. If a tamper is not available, | compacting should be done by hand.
4. The trench should be completely filled. The backfill should be placed and spread in fairly uniforml layers to prevent any unfilled spaces or voids. Large rocks, stones, frozen clods, or other large debris I should be removed. Heavy tampers or rolling equipment should only be used to consolidate only the| final backfill.



Vectus CPVC Pipes - Do's and Dont's

DO'S

1. All products should be installed according to VECTUS's Installation instructions and manual and recommended safe work practices should be followed.
2. Pipe and fittings should be stored in original packaging, in covered area, until needed.
3. Use tools designed for use with plastic pipe and fittings.
4. Hydraulic pressure testing after installation should be conducted to detect any leaks and faults. Wait for appropriate cure time before testing. Fill lines slowly and bleed air from the system prior to pressure testing.
5. Cut-off minimum 25 mm beyond the edge of the crack in case any crack is discovered on the pipe.

   Pipe may be cut quickly and efficiently by several methods. Wheel-type plastic tubing cutters are preferred. Ratchet type cutters or fine tooth saws are another option. However, when using the ratchet cutter, be certain to score the exterior wall by rotating the cutter blade in a circular motion around the pipe. Do this before applying significant downward pressure to finalise the cut. This step leads to a square cut. In addition, make sure ratchet cutter blades are sharp. Cutting tubing as squarely as possible provides optimal bonding area within a joint.

   Burrs and filings can prevent proper contact between the tube and fittings during assembly, and should be removed from the outside and inside of the tube. A chamffering tool is preferred, but a pocket knife or file is also suitable for this purpose.

   Only use CPVC Cement recommended by Vectus. Use only CPVC Cement or an all-purpose cement conforming to ASTM F-493 or joint failure may result.
6. While embedding the pipes on the walls or in the floors, ensure that there are no sharp edges in contact with the pipe.

   When making a transition connection to metal threads, use a special transition fitting or CPVC male threaded adapter whenever possible. Do not over-torque plastic threaded connections. Head tight plus one-half turn should be adequate.
7. Rotate the pipe 90° to 180° to spread the CPVC Solvent Cement evenly in the joint while pushing the pipe into fitting.
8. Always use Teflon tapes with threaded fittings.
9. Provide vertical & horizontal supports as recommended using the plastic straps only.
10. When connecting to a gas water heater, CPVC tubing should not be located within 50 cm of the flue. For water heaters lacking reliable temperature control, this distance may be increased up to 1m. A metal nipple or flexible appliance connector should be used. This eliminates the potential for damage to plastic piping that might result from excessive radiant heat from the flue.
11. Apply a water- based paint only on exposed pipes & fittings.
12. All joints should be inspected for proper cementing at the end of shift or day. A visual inspection of the complete system is also recommended during pressure testing.
13. Use of a brass/CPVC transition adapter when connecting CPVC to a water heater will help facilitate water heater replacement in the future.
14. Pressure test CPVC systems in accordance with local code requirements.

DON'T'S

1. Do not use metal hooks or nails to support / hold or put pressure on the pipes. Do not use straps & hangers with rough or sharp edges. Do not tighten the straps over the pipes.
2. Never expose the pipe to open flame while trying to bend it.
3. Do not drop pipes on edges from heights. Do not drop heavy objects on pipes or walk on pipes.
4. Do not dilute solvent cement with thinners or MTO or any other liquid etc.
5. Do not use air or gases for pressure testings.
6. Do not use any other petroleum or solvent- based sealant, adhesive, lubricant or fire stop material on CPVC pipes and fittings.
7. Do not use CPVC pipes & fittings for pneumatic applications.

Safe testing of CPVC Pipe System

You've just installed a new CPVC plastic pipe and fittings system. The cement joints have been adequately cured and you are ready to test and inspect the system for leaks.

CAUTION: Air testing can be dangerous!

The most common test method is to use water under moderate pressure. However, installers sometimes opt for testing with air pressure because it is quicker and easier. But air testing, if done improperly, can be hazardous.

Air is a compressible gas that can store far more energy than water when put under pressure because it can release this energy so rapidly. This raises the possibility of an explosion. The most common cause of failure is to employ too much air pressure, which can result in an explosion. Other testing mistakes that can cause failures are:

- Applying pressure over 6 psi to the system.
- Using a gauge graduated to more than three times the test pressure.
- Failing to vent trapped air.
- Failure to depressurize the system.
- Failure to remove the test plugs with caution.

All can cause piping to fail risking an explosion that can cause serious personal injury or death and property

Proper recommendations for Water testing

It is important to know that we do not recommend air testing and cannot be held liable for any injuries occurring during the air testing of our product.

We also caution against using our product to store or convey air or other gases or failing to vent trapped air. Many accidents have been reported as a result of air testing or trapped air.

Overall, water testing is a safer, more reliable and more accurate method for testing CPVC plastic piping systems. Because CPVC pipe and fittings are designed to convey liquids, we recommend testing with water. The purpose of the test is to locate any leaks at the joints and correct these prior to putting the system into operation. Because it is important to visually inspect the joints, a water test must be conducted prior to closing in the piping or back filling underground piping.

If there is a leak in the system, it will always be easier to locate when testing with water; air leaks can be hard to find. Air tests have a built-in inaccuracy that is hard to control. The system pressure changes with temperature; whereas, a water pressure test is not as sensitive to temperature variations.

To properly water test, plugs should be inserted through test tees to isolate each section being tested. All other openings should be plugged or capped with test plugs or test caps. Then fill the system being tested with water to the highest point. The hydrostatic pressure created as the water fills the vertical pipe increases as the water height climbs. Filling the system slowly should allow any air in the system to escape as the water rises in the vertical pipe. All air trapped in the system must be expelled prior to the beginning of the test. Failure to remove entrapped air may give faulty test results.

If a leak is found, the joint must be cut out and discarded. A new section can be installed using couplings. Once the system has been successfully tested, it should be drained and the next section should be prepared for testing.

When it comes to testing pipe and fitting installations, water testing is a safer, more thorough method than air testing. Taking a few extra minutes to properly test piping systems with water pays off in error-proof installation and a safer job site.

Vectus Industries Limited

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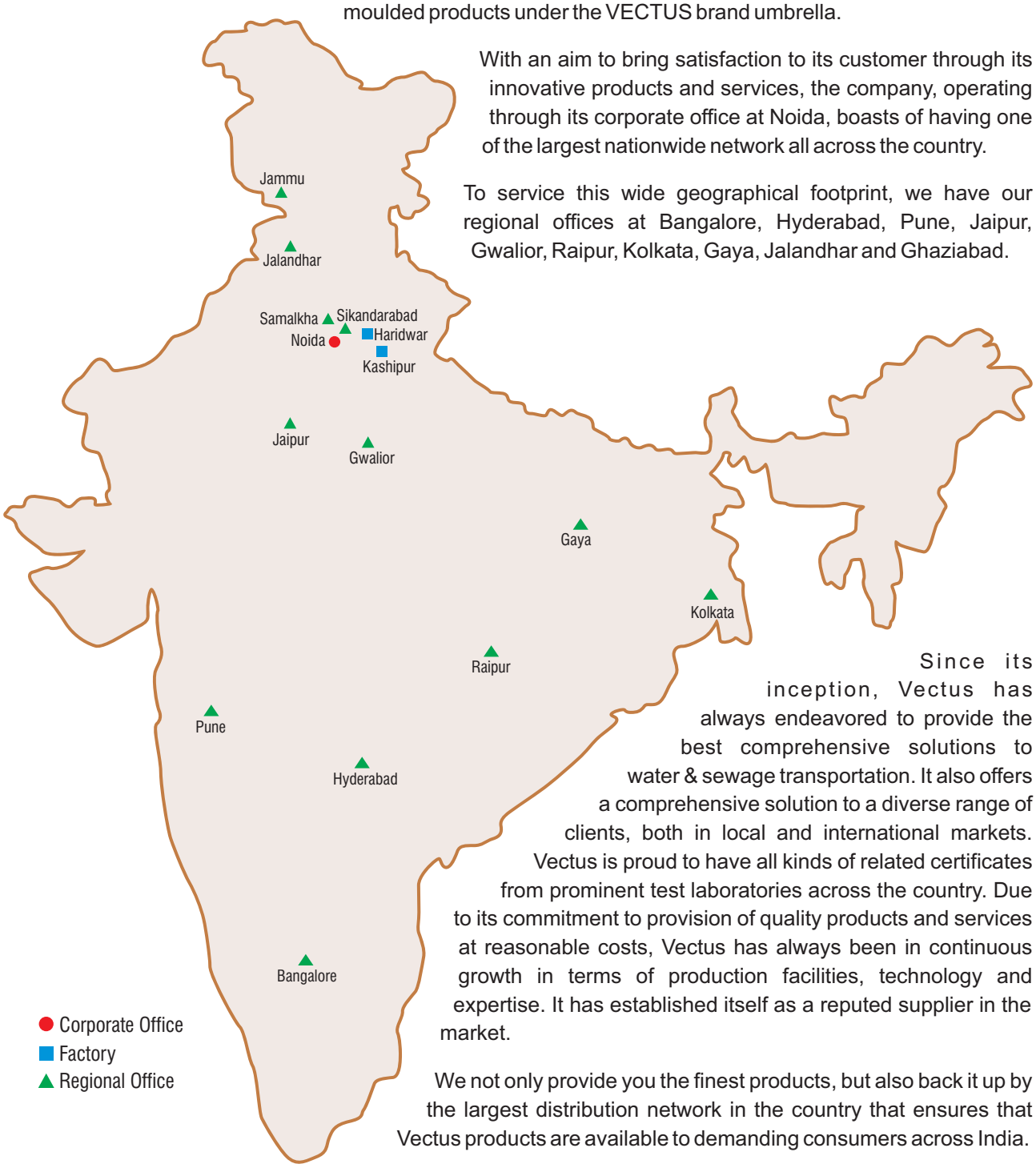
Vectus Industries Limited is one of the largest producer of Poly Propylene Random Copolymer (PPR-C) piping system in the country. Besides PPR, we also manufacture lead-free PVC pressure, agriculture and sewage piping system, ASTM piping, composite piping, storage water tanks and moulded products under the VECTUS brand umbrella.

With an aim to bring satisfaction to its customer through its innovative products and services, the company, operating through its corporate office at Noida, boasts of having one of the largest nationwide network all across the country.

To service this wide geographical footprint, we have our regional offices at Bangalore, Hyderabad, Pune, Jaipur, Gwalior, Raipur, Kolkata, Gaya, Jalandhar and Ghaziabad.



Since its inception, Vectus has always endeavored to provide the best comprehensive solutions to water & sewage transportation. It also offers a comprehensive solution to a diverse range of clients, both in local and international markets. Vectus is proud to have all kinds of related certificates from prominent test laboratories across the country. Due to its commitment to provision of quality products and services at reasonable costs, Vectus has always been in continuous growth in terms of production facilities, technology and expertise. It has established itself as a reputed supplier in the market.

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