

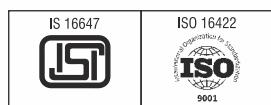


PVC-O CATALOGUE

WHERE
STRENGTH
MEETS
TOUGHNESS!



For a safe water supply
across climate conditions



Corrosion-resistant •
High-pressure Conveyance •
Lifetime Warranty •

NO LEAD
NO HEAVY
METALS

Introduction

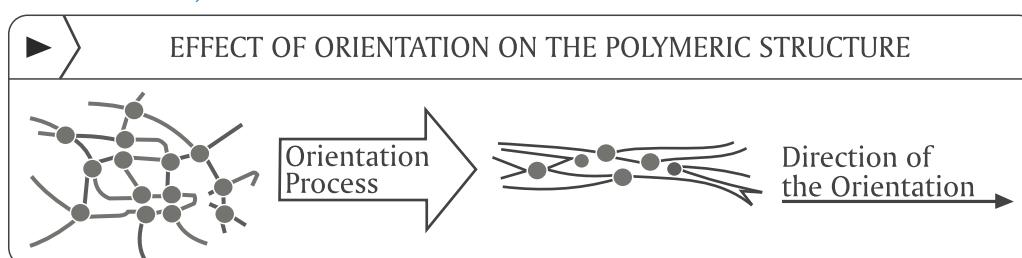
The global crisis has brought new challenges to the water industry. The water infrastructure sector is forced to lower product and installation costs, boosting installers and pipe manufacturers to offer alternative solutions more efficiently. Currently, pipe materials used for water transport include mainly plastics (PVC, HDPE) and metals (Ductile Iron, Cast Iron). Plastic materials are more likely to be used for small and medium water nets, with pressures ranging up to PN 16 bars, due to material brittleness and low-impact resistance restrictions. Ductile iron is used for large water nets in pressure PN 25 bars. However, other troubles arise due to corrosion and therefore service life expectancy is compromised.

The Product PVC-O Pipes

In recent years, new technologies have emerged to manufacture PVC-O pipes that considerably improve the traditional mechanical properties of plastic pipes. International standards rule the PVC-O pressure requirements, which enable pressure pipe applications up to PN 25 bars.

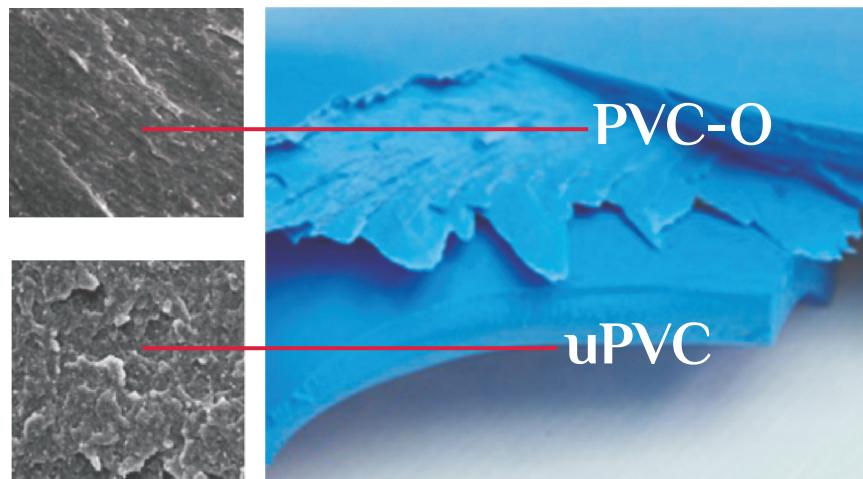
Pioneers in the line of manufacturing plastic pipes in India, Ori-plast launched PVC-O Pipes in 2019. The pipes are made conforming to the Standards IS 16647: 2017 and ISO 16422 in a state-of-the-art plant located at Birkont near Raipur, Chattisgarh. On-plast is the first ISI-certified company in India for PVC-O Pipes (IS 16647:2017).

Molecular orientation, the PVC revolution



The molecular orientation process modifies the PVC's structure by giving the polymer's molecules a linear orientation.

The molecular structure is the main feature that confers its mechanical properties to the PVC. PVC is a polymer which presents an amorphous molecular structure where chains are arranged in random directions.



However, when stretching the material and under certain conditions of pressure, temperature and speed, the polymer molecules are aligned in the same direction as the stretching, resulting in a laminar structure.

The result: the highest properties & the lowest costs



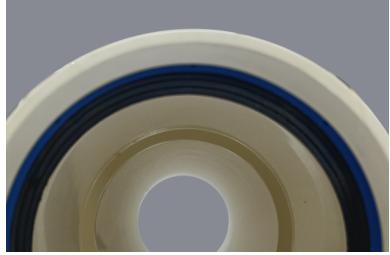
The process of molecular orientation greatly enhances the PVC's physical and mechanical properties, maintaining the original polymer advantages. It becomes an unbeatable plastic in terms of strength, impact resistance and flexibility without altering chemical properties.

Hoop and axial orientation

The orientation degree defines the PVC-O class. The higher the class, the greater the orientation degree and the better mechanical properties are achieved. The class is evaluated according to the long-term hydrostatic strength test. The orientation is produced in the stretching direction. Ori-Plast's technology system enables it to attain orientation both in the hoop and axial direction, obtaining complementary benefits.

Axial orientation is particularly relevant in the socket, where axial strains could be produced.

Hoop orientation confers excellent qualities such as impact resistance and internal pressure resistance.



Long-term hydrostatic resistance

Pipes are subjected to the internal pressure produced by the fluid circulation over a long period of time. The evolution in time of the material strength is known as creep and appears to a far lesser extent in **PVC-O class 500** than in conventional plastics, which means better long-term performance.

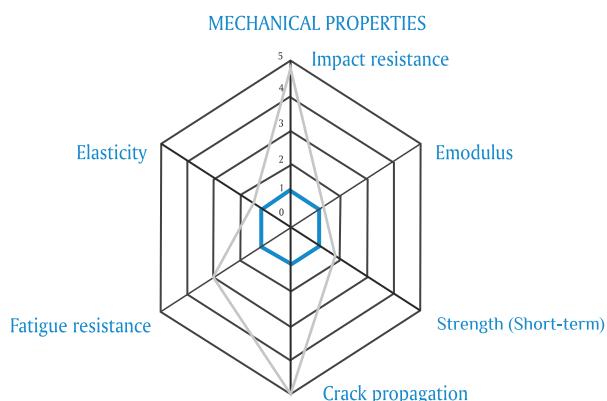
PVC-O class 500 is the highest class recognized by the International Standard ISO 16422 and IS 16647, presenting the best mechanical properties.

Excellent short-term performance

PVC-O class 500 pipes have a very different stress-strain curve when compared to other plastics and come very close to the curve of metals. The mechanical properties of PVC-O improve as the so-called "creep valley" disappears. This phenomenon can only be achieved with the highest degree of orientation, **class 500**.

Mechanical properties

Molecular Orientation increases the PVC-O pipe's mechanical properties, obtaining a much more resistant and flexible impact resistance, no crack propagation and fatigue resistance, among other properties, are greatly enhanced without altering the chemical properties.



Unbeatable impact resistance

PVC-O class 500 pipes are not easily destroyed by regular impacts. The risk of bursting during installation due to stone dropping or impact is minimal. The layered structure achieved with the molecular orientation process protects from crack propagation and scratches.

No crack propagation

The layered structure achieved with the Molecular Orientation process is the main feature which prevents crack propagation along the pipe wall thickness. During the installation, scratches caused by stones on the site might be produced. When cracks appear, they progress through the amorphous wall structure. In **PVC-O class 500** pipes, these cracks remain on the first layers, not affecting the pipe's properties at all.

Absence of RCP

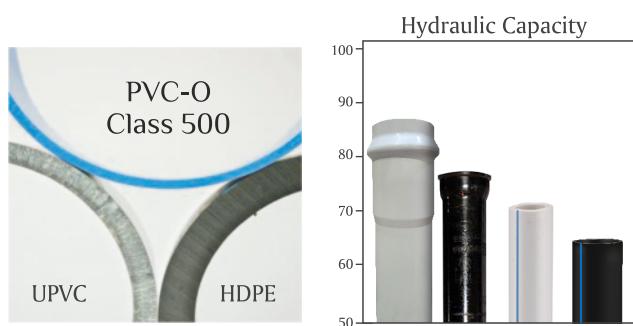
The phenomenon of rapid crack propagation (RCP) can take place under certain conditions of temperature and pressure. Brittle cracks can propagate along the pipe wall in the axial direction at a speed of 100 to 400 meters/second. The energy needed for this fast propagation is supplied by the fluid under pressure within the pipe. This phenomenon, very common in some pipes, is minimized in PVC-O pipes due to the material's nature.

High short and long-term hydrostatic resistance

PVC-O class 500 pipes offer resistance to internal pressure up to two times the nominal pressure, which means that they can bear a sporadic excess of pressure such as water hammers in the network. The durability of the pipe working at nominal pressure is ensured. Thanks to the low material creep behaviour for over a hundred years.

Increased hydraulic capacity

PVC-O class 500 reduces the pipe's wall thickness, giving a greater internal diameter and flow section. Besides, the perfect finishing on the internal surface makes it extremely smooth, minimising load loss and making it more difficult for deposits to be formed on the inner walls. As a result, **PVC-O class 500** pipes offer between 15%-40% more hydraulic capacity than pipes made from other materials (PVC-U, HDPE and Ductile Iron) with the same external dimensions.

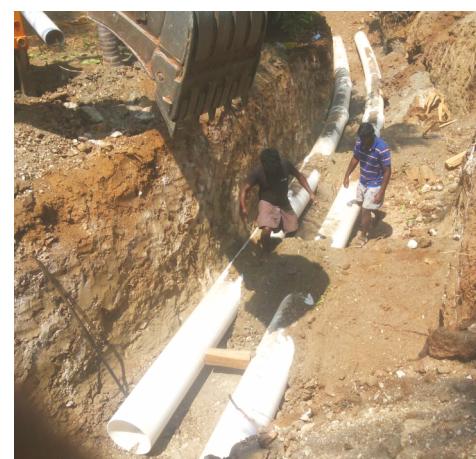
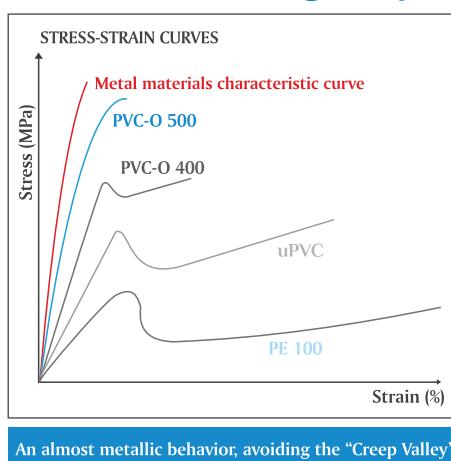


Maximum flexibility

PVC-O class 500 pipes can bear deformation up to 100% of their internal diameter. Thanks to their excellent elasticity. When crushed, or in the event of a mechanical accident, they immediately recover their original shape, thus eliminating the risk of potential breakage by soil subsidence.

Excellent behaviour in extreme working temperatures

HOT: up to 45°C
COLD: down to -25°C



In general, the plastics' capacity to absorb impacts is very much related to the temperature. Below -10°C, plastics can present a brittle behaviour, which makes them inappropriate for cold climates. **PVC-O class 500** pipe does not present significant variations in its capacity to absorb impacts even in the most extremely cold areas of the world.

UV Radiation

UV radiation promotes micro-cracks on the UPVC surface and other plastic pipes exposed to sunlight over a long period of time. These cracks propagate through the plastic pipe's wall thickness. PVC-O pipes' layered structure blocks them, so they remain on the outside layer. That is why the pipe's behaviour is not affected. Tests carried out with PVC-O pipes exposed to sunlight during a period of more than a year have shown an equivalent response to those non-exposed to UV.

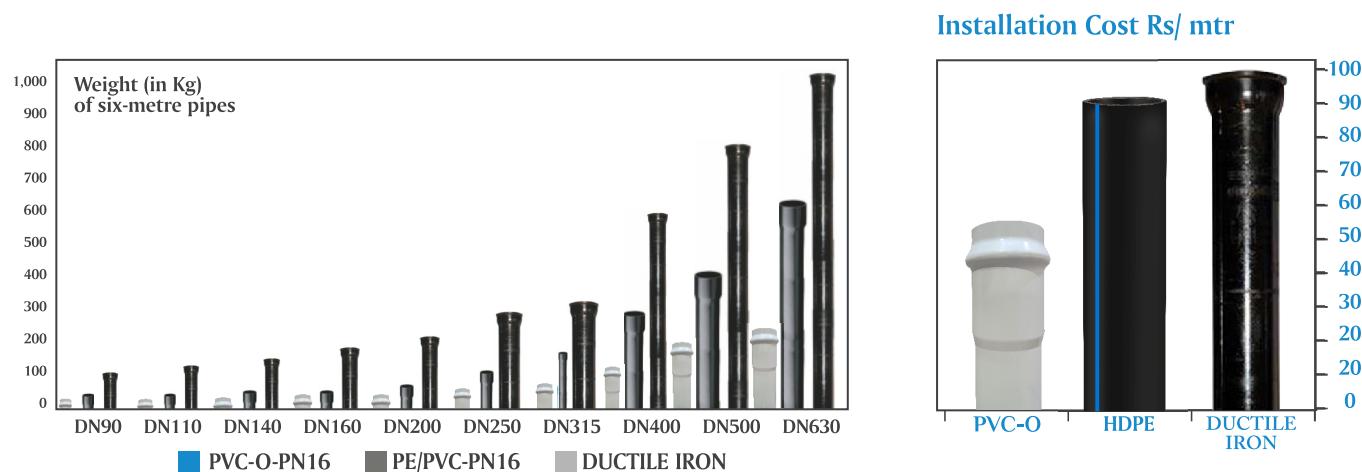
Corrosion Resistance

PVC-O class 500 pipe is immune to the corrosion caused by natural substances in the soil or agricultural chemicals. Therefore, it is not degradable and does not require any special protection or coating solution, which is translated into cost savings. The quality of the conveyed fluid always remains unaltered since there is neither corrosion of the material nor migration within the pipes or on their coating. Mandatory tests show compliance with the required health standards for water's human consumption.

Lower installation costs

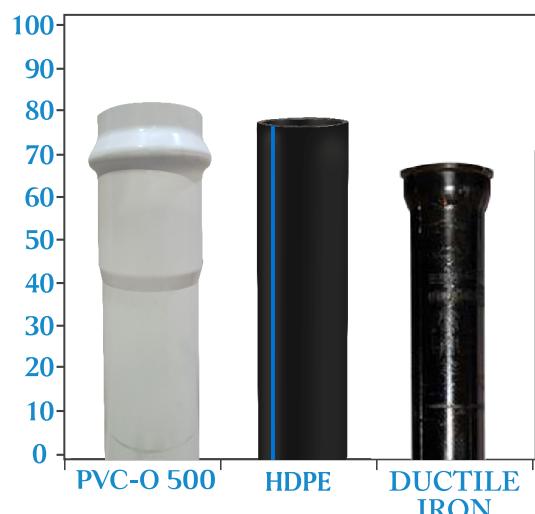
PVC-O 500 pipes are lighter and easier to handle than pipes made of other materials. In most cases, no machinery is required to handle them. Indeed, easy handling, better performance and installation speed compared to other kinds of pipes contribute to installation cost savings.

PVC-O 500 pipes are lighter and easier to handle than pipes made of other materials: between 6 to 12 times lighter per meter than ductile iron pipes with the same nominal external diameter.



Lighter pipe: easy to handle, fast to connect

PVC-O 500 pipes weigh less than half the usual weight of PVC and HDPE and are between six and twelve times lighter than ductile iron pipes of the same diameter. They are easy to handle and they can be lifted without mechanical assistance (for pipes up to DN 315 mm). During the installation process, the connections between pipes are faster and there is no need for welded unions, thanks to the pipe's design and the **PVC-O 500** properties. Besides, due to the **PVC-O 500** toughness, the scratches caused by impacts are minimal and the pipes present many advantages while unloading and burial.



Applications

WATER SUPPLYING Conduits for potable water transport. They include water extraction, a water distribution network to city centres and industrial areas, and water transfer to tanks and reservoirs.

IRRIGATION Water transport pipes for irrigation purposes. They include irrigation land pipelines and water transfer to tanks and reservoirs.

RECLAIMED WATER Pipelines for the transport of water that have been treated to remove impurities.

Other Applications

- Sewage
- Fire Protection Nets
- Industrial Applications
- Infrastructural Nets

Fittings

PVC-O 500 pipes are compatible with all kinds of Ductile Iron fittings-Tee, Elbow, Saddle, Flange etc.

Tapping saddles allow connecting the pipe in the perpendicular direction to all kinds of fittings, being available with screw ends and flange ends.

Flanges with an anti-traction system allow connecting the spigot ends to all kinds of fittings with connection to a flange.



Fittings with plugs euro type are connected directly to the pipe allowing for deviations, reductions and connections on the net.

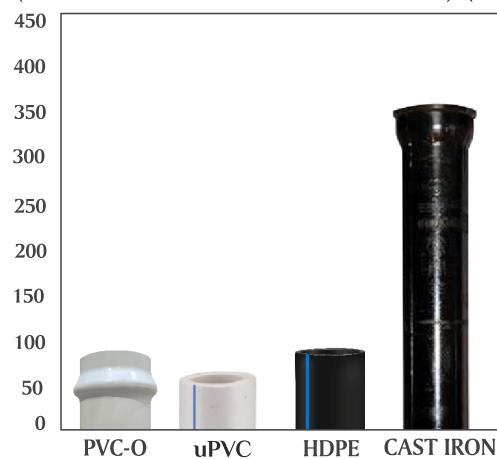
The most eco-friendly solution for water transportation

Energy savings

Embodied energy is defined as the non-renewable energy consumed in all the activities associated with the pipe's lifecycle. This lifecycle includes raw material extraction, manufacture installation and other supporting functions, such as transport.

The key factors that determine energy savings are the type of raw material used, the production process, the quality of the finished product and the pipe's life expectancy. Raw material saving implies energy reduction during extraction and material production. This is also a factor to bear in mind during the installation and transportation that weight reduction makes it easier and quicker for the installer.

**Energy consumed by pipes
(raw materials+manufacture) (kWh)**



The energy consumption required by Ori-Plast Technology is not only lower than the required by pipes made of other materials but also compared to the required by other PVC-O pipe production processes.

PVC-O 500 pipes' inner wall is extremely smooth keeping pressure loss down to a minimum, which considerably reduces the energy required for fluid transportation. Throughout the entire life cycle. **PVC-O 500** pipes avoid the unnecessary use of energy.

Water supply networks made of traditional materials are currently registering a leakage rate of up to 25% of channelled water and their chemical deterioration results in having to replace some water conduits despite having been laid only a few years before.

Dimensions

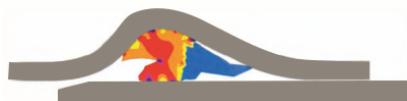
| Safety Coefficient C – 1.4 , Material Class 500, Ref IS Std – 16647 : 2017 | | | | | | | | | | | | |
|--|-----------------------------|-------|-------|---------------------|-----------------------------|-------|-------|---------------------|-----------------------------|-------|-------|---------------------|
| PN 12.5 | | | | PN 16 | | | | PN 25 | | | | |
| DN | Mean Outside Diameter in mm | | | Wall Thickness (mm) | Mean Outside Diameter in mm | | | Wall Thickness (mm) | Mean Outside Diameter in mm | | | Wall Thickness (mm) |
| mm | Min | Max | Avg | Avg | Min | Max | Avg | Avg | Min | Max | Avg | Avg |
| 110.0 | 110.0 | 110.4 | 110.2 | 2.2 | 110.0 | 110.4 | 110.2 | 2.9 | 110.0 | 110.4 | 110.2 | 4.3 |
| 160.0 | 160.0 | 160.5 | 160.3 | 3.2 | 160.0 | 160.5 | 160.3 | 4.0 | 160.0 | 160.5 | 160.3 | 6.2 |
| 200.0 | 200.0 | 200.6 | 200.3 | 3.9 | 200.0 | 200.6 | 200.3 | 5.0 | 200.0 | 200.6 | 200.3 | 7.7 |
| 250.0 | 250.0 | 250.8 | 250.4 | 4.9 | 250.0 | 250.8 | 250.4 | 6.2 | 250.0 | 250.8 | 250.4 | 9.6 |
| 315.0 | 315.0 | 316.0 | 315.5 | 6.1 | 315.0 | 316.0 | 315.5 | 7.7 | 315.0 | 316.0 | 315.5 | 12.1 |
| 400.0 | 400.0 | 401.2 | 400.6 | 7.7 | 400.0 | 401.2 | 400.6 | 9.8 | 400.0 | 401.2 | 400.6 | 15.3 |

PVC-O PIPES ARE APPROVED / USED BY FOLLOWING STATE & WATER BOARDS.

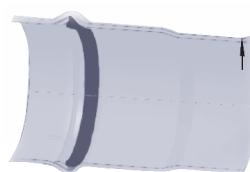
| SL.NO. | Central Government | Department |
|--------|---------------------|---|
| 1 | Government of India | CENTRAL PUBLIC HEALTH & ENVIRONMENTAL ENGINEERING ORGANISATION (CPHEEO). |
| 2 | | MINISTRY OF JAL SHAKTI. |
| SL.No. | State | Department |
| 1 | MAHARASHTRA | MAHARASHTRA JEEVAN PRADHIKARAN. WATER RESOURCE DEPARTMENT MAHARASHTRA. |
| 2 | ODISHA | ODISHA INDUSTRIAL INFRASTRUCTURE DEVELOPMENT CORPORATION. RURAL WATER SUPPLY AND SANITATION DIVISION ODISHA. |
| 3 | WEST BENGAL | GOVERNMENT OF WEST BENGAL DIRECTORATE OF PUBLIC HEALTH ENGINEERING. |
| 4 | CHHATTISGARH | GOVERNMENT OF CHHATTISGARH PUBLIC HEALTH ENGINEERING DEPARTMENT. CHHATTISGARH URBAN DEVELOPMENT AUTHORITY. |
| 5 | MADHYA PRADESH | GOVERNMENT OF MADHYA PRADESH PUBLIC HEALTH ENGINEERING DEPARTMENT. |
| 6 | RAJASTHAN | GOVERNMENT OF RAJASTHAN PUBLIC HEALTH ENGINEERING DEPARTMENT. |
| 7 | TAMIL NADU | TAMIL NADU WATER SUPPLY AND DRAINAGE BOARD. CHENNAI METROPOLITAN WATER SUPPLY AND SEWARAGE BOARD. |
| 8 | GOA | GOVERNMENT OF GOA PUBLIC WORKS DEPARTMENT. |
| 9 | KARNATAKA | BANGALORE WATER SUPPLY & SEWERAGE BOARD. |

Joints and Watertight Seals

PVC-O pipes use the most reputable seal for high-pressure drinking water pipes: The seal comprises a PP ring and a synthetic rubber lip that is an integrated part of the pipe avoiding displacement from its setting or movement when installation is taking place.



Seal design and function



Watertight Anger-lock Seal

Accessories

PVC-O pipes are compatible with all accessories valid for conventional PVC pipes made of either PVC, cast iron, steel or other metallic materials.

- Curves, reducers, hoses and T-joints with an elastic joint
- Saddle tapping, with or without load
- Repair accessories
- Accessories for traction work

SO TOUGH IT BEARS ANYTHING!



PVC-O pipes, manufactured by Ori-Plast, are tested on a regular basis under heavy loads to check their toughness and the maximum load the pipes can bear. After successive results, it is shown that our PVC-O pipes are not just a perfect example of unmatched strength, but also they are world-class. Trust our PVC-O pipes, for they are born to weather all changes.

Ori-Plast®
HEALTHY PIPES

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