PVC-O pipe innovations

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Molecor, a Spanish company founded in 2006, is the current leading company in the development of the Molecular Orientation Technology applied to water under pressure canalizations. Its genuine and exclusive technology has allowed the company to launch innovative developments over the years into the market that nowadays it is considered one of the most important referents of growth, continuous improvement and internationalization.

The success of Molecor’s technology is not only based on its pioneering character but also demonstrated by its incredible results. It consists of a completely dry and clean air system that distributes the air in a specific way to achieve the maximum degree of orientation, replacing boiling water used in other manufacturing processes. This new system developed by Molecor allows manufacturing Class 500 PVC-O pipes with better mechanical properties and therefore a higher quality final product: TOM® pipes (Fig. 1).

Due to the research and development in which the company is immersed, and thanks to its commitment to innovation, Molecor has been able to develop multiple systems. Each of them has become a turning point in its sector since it has contributed and allowed the company to overcome obstacles in PVC material.

Among these developments is the M-OR-P 3163 system which was presented in 2010. The novelty of this system was its capacity to manufacture PVC-O pipes up to DN630 mm. It was the first time that a company was capable of manufacturing PVC-O pipes with this diameter. However, not satisfied with this, Molecor presented the M-OR-P 3180 System just three years later, a system with which the company became the first company capable of manufacturing the largest PVC-O pipes. In this case we are talking about DN800 mm PVC-O pipes capable of enduring nominal pressures up to 25 bar.

The Integrated Seal System and the Integrated Socket System are two other important milestones achieved by the company. The first one enables a rubber gasket to be inserted inside the pipe in a completely automatic way, ensuring a complete and perfect attachment. This development is one of the most important milestones developed by the company since this technology has never been applied to PVC-O pipes before.

The Integrated Socket System allows the production of the socket, the most important part of the pipe, while the rest of the pipe achieves optimum conditions for the molecular orientation. In addition to the stability and simultaneity of the process, Molecor’s technology achieves different degrees of orientation in the required sections of the socket.

The enormous success of Molecor’s technology is explained by its multiple advantages. Instead of boiling water, the use of air prevents possible leakages and the consequent burns that the operators could suffer. It is also a stable system since it presents a fully automatic control center that allows disconnecting the...
machine in stages, preventing the collapse of the line in case of punctual failures.

A standard PVC extrusion system allows the manufactured pipes to meet the specific needs of each customer. Furthermore, it only uses the necessary amount of energy for distributing the air through the pipe, and has an electrical consumption similar to conventional extrusion lines. Molecor’s exclusive technology enables the manufacturing of PVC-O pipes with the greatest degree of orientation, Class 500, achieving savings of around 50%. Furthermore, the improved quality of the product extends its useful life. All these facts lead to significant savings in raw materials and other costs. The different systems developed by Molecor have enabled the company to manufacture not only the largest PVC-O pipes but also the most eco-friendly ones.

PVC-O pipes are not easily destroyed by regular impacts that take place during their manufacturing and installation. In addition, the layered structure achieved with the molecular orientation process prevents crack propagation and scratches. When cracks appear, they progress through the amorphous wall structure. In PVC-O pipes, these cracks remain on the first layer, not affecting the pipe’s properties at all. The result is an increase in product life.

PVC-O pipes also offer resistance to internal pressure up to two times the nominal pressure, which means they can endure a sporadic excess of pressure such as water hammers in the network. Moreover, the material creep behavior is very low, ensuring the durability of the pipe working at nominal pressure for over 100 years.

The Class 500 PVC-O pipes manufactured by Molecor considerably enhance the hydraulic capacity of the pipe, ranging from 15% to 40%, depending on the material and diameter with which it is compared. Furthermore, load losses are much lower due to the extremely smooth inner surface of the pipe, which means that water can be conveyed at a higher speed. Consequently, the capacity of the network is also higher, minimizing energy consumption and CO2 emissions.

PVC-O pipes can bear big deformations of their internal diameter thanks to their excellent elasticity. When crushed, or in the event of a mechanical accident, TOM® pipes immediately go back to their original shape, thus minimizing the risk of potential breakage, for example by soil subsidence or sharp edges on rocks or machinery. Furthermore, due to their considerable capacity for bearing heavy loads, TOM® pipes ensure optimum performance once underground.

TOM® pipes also offer lower celerity than other piping systems (four times less than ductile iron pipes), which means less water hammers caused by sudden variations in water volume and pressure. This reduces and, almost eliminates, the possibility of breakage during opening and closing in the water network and when pumping gets under way, protecting every component of the network.

Despite of all these developments and its enormous contribution to its sector, Molecor is aware of the necessity to continue improving and investing in new projects. EcoFITTOM® fittings are the latest project in which the company has made a huge investment. It consists of the development and manufacturing of the first fittings in PVC-O with which the company offers a continuous solution in PVC-O. These fittings present multiple advantages in terms of performance, savings, sustainability and installation, as with the TOM® pipes, since they are manufactured with the same technology.

EcoFITTOM® fittings with non-discontinuity ensure water tightness; reduce breakages, leakages and failures in comparison to other systems. EcoFITTOM® is also immune to corrosion and to chemical attacks from micro and macro organisms. The quality of the conveyed fluid remains unaltered in compliance with health standards for water’s human consumption. EcoFITTOM® also reduces water hammer by up to four times compared with other materials. The molecular orientation process also makes it possible to manufacture PVC-O pipes with a greater internal diameter and flow section.

The excellent mechanical properties of PVC-O enable a significant reduction in the use of raw material compared to other products with the same physical requirements, reaching important material savings. The energy consumption needed in the manufacturing process is slightly lower than other PVC-O pipe manufacturing processes and considerably lower than other plastic pipes. The petrol consumption needed to manufacture the raw material is lower than for other plastic conduits. No protection or coating is needed vs iron. There are also many savings in production, installation and maintenance processes.

EcoFITTOM® preserves the environment, considering aspects such as energy saving, or sustainable use of natural resources, among others. More than 50% of PVC resin is made of chlorine, derived from common salt, which significantly contributes to non-renewable resources savings. It can be also be recycled, as it is used not only for new piping production, but for urban furniture, road safety elements, window profiles, sound proofing panels, and more.

PVC-O pipes are lighter and easier to install than other materials. No machinery is required to handle them since it is between 6 and 12 times lighter than ductile iron. The efficient socket design also provides a robust rubber sealing ring and faster connection between pipes and fittings; the plug-in limit mark facilitates installation and ensures their correct assembly. Furthermore, the PVC-O is durable and prevents leakage of channeled water, as well as ensuring a life of over 50 years, versus other materials which last 30 years. They are also easy to assemble since there is no need for welding. Its weight allows higher performance and installation speed compared to the rest of the materials (Fig. 2).
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