

2. Key Benefits

What Are the Main Advantages of PVC Piping Systems?

■ Preliminary comments

- All the statements formulated in this section are substantiated in the relevant pages of the Training Package
- Comparison with other materials are done for each application are only based on facts that can be substantiated



What Are the Main Advantages of PVC Piping Systems?

- High performance material, both short and long term
- Strong, tough material, highly impact resistant at ambient temperatures
- Superior long-term stiffness, good resistance to deformation, ovalisation and bow
- High strength/weight ratio, strong despite its light weight, thus easy to handle
- Excellent resistance to water corrosion and abrasion
- High resistance to a broad range of chemicals, to waste waters and detergents, fertilisers, phytosanitary products
- High UV resistance, when properly formulated
- Excellent weathering resistance, including in salt atmosphere (seaside), proven by its use in outdoor applications like rainwater goods, windows and roller shutters
- Highly reliable jointing systems: solvent cement and push-fit (O-ring)



What Are the Main Advantages of PVC Piping Systems?

Highly durable, long lasting and reliable

- PVC piping systems have a long track record, they have been tried and tested over 80 years of service life, with low failure rates

Service life that can be expected for PVC systems

- 30 years at least (similar to PVC windows) for outdoor above ground applications (rain gutters)
- 50 years for above ground indoor building applications (gravity soil & waste and pressure hot & cold*)
- More than 50 years for underground fresh water* and sewage applications
 - The first installed PVC pipe works are now reaching 80 years in operation
 - Studies suggest that service life in these applications will exceed 100 years

* subject to disinfection procedures applied to the network



What Are the Main Advantages of PVC Piping Systems?



The perfect partner to preserve your drinking water quality

- Hold sanitary certificates in all major EU markets.
- PVC behaves like an inert material
 - Very low level of migration into drinking water (DW), close to detection limits
 - Low microbial growth potential, reduced biofilm development
- Preserved by the absence of internal corrosion and much reduced lime scale development compared to metallic pipes. Both latter factors promote bacterial growth in DW pipes.
- Compatible with disinfection procedures, including chlorine dioxide. PVC is best performer among General Purpose plastics.
- Non permeable to fluids, germs, oxygen and ultraviolet rays. PVC will prevent external elements passing through the pipe and contaminate the DW.

What Are the Main Advantages of PVC Piping Systems?

The perfect partner to preserve your air quality

- All along its service life, PVC does not emit VOC, nor chlorine, nor any other chemical in significant quantities, nor smell.
- Solvent cements do release small quantities of VOC in the air, right after installation. After a few days, VOC emitted by the pressure and gravity pipes used in collective and individual dwellings, reach insignificant levels.



What Are the Main Advantages of PVC Piping Systems?



Significant contribution to fire safety

- PVC pipes are difficult to ignite (ignition temp. is 150°C higher than that of wood)
- PVC pipes are difficult to burn, they are self extinguishing
- When burning in a fire they release a limited amount of heat, no flaming droplets, meaning a limited contribution to fire propagation
- PVC pipes are able to reach Bs1d0 reaction to fire rating, the best rating category among carbon-based materials
- They provide an outstanding resistance to fire propagation from room to room
- PVC pipes reduce the risk of fire and will have a limited contribution to developing the fire and reach the flash-over
- A strong advantage when used in indoor applications (Building Services), in particular in public and high-rise buildings

What Are the Main Advantages of PVC Piping Systems?

PVC pipe systems show a favourable environmental profile

- PVC pipe systems are fully recyclable and increasingly recycled
- The production of PVC pipe systems from resin production to installation generate low CO₂ emissions
- PVC pipe systems' LCAs show favourable environmental profiles
- EPD based comparisons with non-plastics alternative solutions show strong advantage in most applications.
- Chemicals involved in PVC pipe systems' manufacturing are subject to REACH compliance
- PVC resin production is strongly regulated and under high scrutiny in EU
- Fewer trucks needed to transport the pipes compared to non-plastics materials (concrete, clay, steel, ductile iron)



What are the Main Advantages of PVC Piping Systems?



The right partner for your new build and renovation projects

- Superior hydraulic characteristics, sustainably preserved by absence of corrosion and reduced lime scaling
- Broadest range of fittings, enabling adaptation to most designs and field situations
- Fully interchangeable, standardised piping systems, guaranteeing watertight seals when mixing components from different manufacturers
- Solvent cement and push fit (O-ring) provide easy to use and reliable pipe joints
- Solvent welding provides a 100% safe connection, fixed for ever
- No heavy tools, no fire permit needed
- Fast and easy to install:
 - Works duration is shorter
 - Improved health and safety working conditions for workers (light weight material)
 - Cost savings at installation stage

What Are the Main Advantages of PVC Piping Systems?

The right partner for the owner's finances

- PVC material offers a high performance/cost ratio
- PVC offers cost-efficient solutions at investment (cost of materials) and installation times (savings on labour time)
- Very low maintenance costs
- Low leakage and failure ratios, favourably comparing to those of non plastics pipe systems (concrete, clay, metal), thus reduced repair costs
 - Proved by a number of field surveys on utility networks in operation - see relevant pages



Reference

A. Marangoni, PVC-U Pipe Competitiveness: A Total Cost of Ownership Approach, 2019 <https://pvc4pipes.com/resources/publications/pvc-u-pipe-competitiveness-total-cost-of-ownership/>

What Are the Main Limitations of PVC Piping Systems?

Though PVC pipe systems offer many benefits, it is fair to mention some limitations and weaknesses

Brittleness at low temperature

- Brittleness depends much on the pipe quality – modern quality pipes become brittle when temperature reaches around 5°C
- PVC-U pipes with the Nordic Poly Mark and special impact resistant PVC grades (PVC-Hi) are tested for impact resistance at -10° C, bearing the ice crystal symbol
- However, product standards do not set a lower limit for installation temperature; in colder climates, pipes should simply be handled appropriately during installation
- PVC-O also presents a high impact resistance as result of the improvement of mechanical properties due to molecular orientation
- Once in place PVC pipes can be serviced at temperatures much below 0°C

Solvent cement

- VOC emissions
- Indoor uncomfortable jointing process, requiring ventilation during indoor installation
- Modern solvent cements have a reduced smell and VOC emissions

60°C temperature limit for PVC-U

- PVC-U has a service temperature limit of 60°C; however, in practical applications, designs generally stay well below this temperature to ensure long-term durability and performance
- PVC-C, with a higher Vicat Softening Point of 104–114°C, is suitable for hot water applications; however, country-specific restrictions may apply for radiator heating (consult with the pipe manufacturer)

