HDPE (POLY) PIPES: A REVOLUTION IN WATER SUPPLY

(Introductory Report –2021)

MONIER WATER SOLUTIONS
(A Division of MONIER LTD.)

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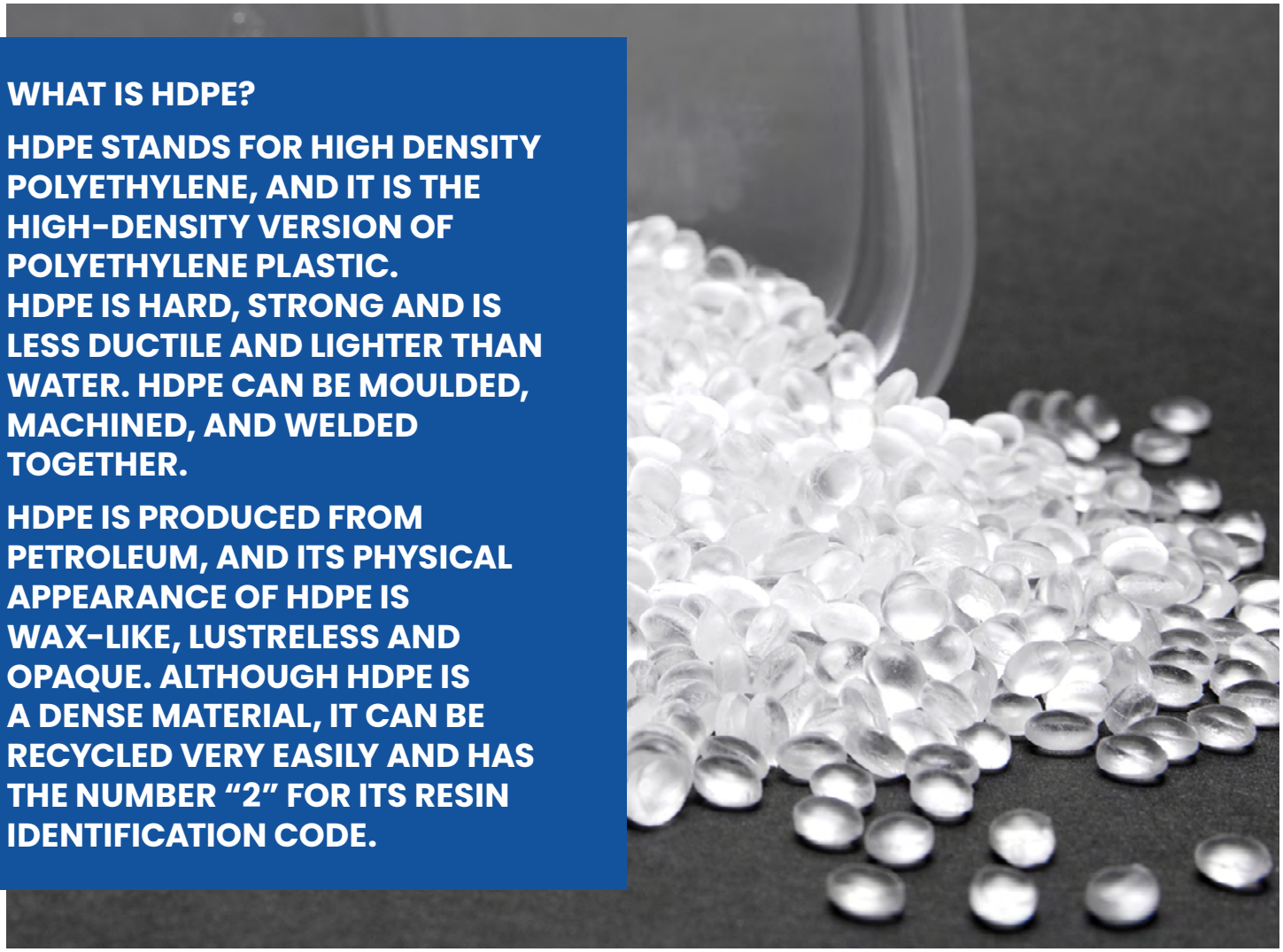
POLY (HDPE) PIPE SYSTEM

A REVOLUTIONARY SWITCH IN TRADITIONAL WATER SUPPLY PIPELINE SYSTEM:

Smooth-wall HIGH-DENSITY POLYETHYLENE PIPE systems is made from polyethylene and is a cost-effective solution for a broad range of piping problems in municipal, industrial, marine, mining, landfill, duct and agricultural applications. It has been tested and proven effective for above ground, surface, buried, sliplined, floating, and sub-surface marine applications.

High-density polyethylene pipe (HDPE) can carry potable water, wastewater, slurries, chemicals, hazardous wastes, and compressed gases. Polyethylene pipe has a long and distinguished history of service in the oil and gas industries as well as the mining industries. It has the lowest repair frequency per kilometer of pipe per annum compared with all other pressure pipe materials used for urban gas distribution. Polyethylene is strong, extremely tough and very durable. Whether you're looking for long service, trouble-free installation, flexibility, resistance to chemicals or a myriad of other features, high-density polyethylene pipe will meet all your requirements.



WHAT IS HDPE?

HDPE STANDS FOR HIGH DENSITY POLYETHYLENE, AND IT IS THE HIGH-DENSITY VERSION OF POLYETHYLENE PLASTIC. HDPE IS HARD, STRONG AND IS LESS DUCTILE AND LIGHTER THAN WATER. HDPE CAN BE MOULDED, MACHINED, AND WELDED TOGETHER.

HDPE IS PRODUCED FROM PETROLEUM, AND ITS PHYSICAL APPEARANCE OF HDPE IS WAX-LIKE, LUSTRELESS AND OPAQUE. ALTHOUGH HDPE IS A DENSE MATERIAL, IT CAN BE RECYCLED VERY EASILY AND HAS THE NUMBER "2" FOR ITS RESIN IDENTIFICATION CODE.

HDPE VS PVC PIPING SYSTEM:

PVC and HDPE are two types of polymeric synthetic plastic materials which are used in many industrial applications. The key difference between HDPE and PVC is the difference in density. HDPE is denser than PVC, and this leads to differences in their physical properties and industrial applications. In addition, the difference in chemical structure and manufacturing process also gives them some unique material properties.

SIGNIFICANT DIFFERENCES:

1. Composition

PVC is a durable polyethylene thermoplastic made from petroleum, due to its heat sensitivity, it contains many additives. HDPE is made more durable with carbon black as compared to PVC.

2. Processability

The HDPE pipe manufacturing process consumes less additives whereas PVC pipe requires many processing aids to manufacture.

3. Durability

Both HDPE and PVC pipes are stronger throughout higher temperatures. However, in particular circumstances, strength cannot be used to compare the two. PVC has a failure rating of 1 in 48,650 incidents, where HDPE is 1 in 10,000,000. This indicator shows that when exposed to extreme weather conditions, HDPE is proven to be more durable and a far more superior product.

4. Thermal Performance

When exposed to hot or cold weather, a slow expansion can be experienced. HDPE expands 4 times more compared to PVC pipes.

5. Recyclability

PVC material are very poor in direct sunlight exposure and after few years of direct sunlight exposure, it can't be recycled. HDPE is a durable plastic with antioxidants, it can withstand direct sunlight and last up to 100 years in service. After service period, it can be recycled easily.

6. Environmental Impact

PVC has a higher carbon emission and energy consumption in the manufacturing and recycling process compared to HDPE which has a 22% less energy and carbon emissions.

7. Installation

HDPE can be installed in the following ways:

- Open trench
- Directional bore
- Horizontal bore
- Drop burial

PVC can be installed in the following ways:

- Open trench
- Drop burial

8. Irrigation

PVC pipes are used for irrigation. However, due to easy fitting joining capability.

HDPE is becoming an increasingly popular choice for irrigation systems. With end-to-end fusion, HDPE pipes are leak-proof and a better option. In places where digging is hard or impossible, HDPE is the best choice.

9. Applications

PVC is very commonly used for sewers, irrigation, drains and other industrial applications.

HDPE has various uses. It is used for the distribution of natural gas, chemicals, and petroleum products. It is widely use in mining sector due to flexible nature. Other uses include water, sanitary and storm sewer systems.

ADVANTAGES OF HDPE PIPING SYSTEM;

HDPE pipes are convenient to use in underground piping because they are found to dampen and absorb shock waves minimizing surges that can affect the system. They also have the best joint pressure resistance and are also more abrasion and heat resistant.

1. Lower life cycle costs

- Leak tight. Heat-fused joints create a homogenous, monolithic system.
- The fusion joint is stronger than the pipe.
- Maintains optimum flow rates.
- Does not tuberculate, has a high resistance to scale or biological build-up and excellent water hammer characteristics.
- Designed to withstand surge events.
- Virtually eliminates breakage due to freezing pipes.
- Additional cost savings are achieved by lower instances of repairs.

2. Reduced installation costs

- Material of choice for trenchless technology.
- Used in directional boring, plowing, river crossings, pipe bursting and sliplining.
- Fewer fittings due to pipe flexibility.
- Allowable bending radius of 20 to 25 times outside diameter of pipe.
- Lighter equipment required for handling and installation than with metallic materials. Eliminates the need for thrust blocking. Heat fused joints are fully restrained.
- Light weight and longer lengths allow for significant savings in labor and equipment.

3. Leak Free

- Polyethylene pipe is normally joined by heat fusion. Butt, socket, sidewall fusion and electrofusion create a joint that is as strong as the pipe itself, and is leak free. This unique joining method produces significant cost reductions compared to other materials.

4. Corrosion, Abrasion, and Chemical resistant

- Polyethylene piping's performance in mining, dredging and similar applications proves it will outwear many more costly piping materials when conveying a variety of abrasive slurries.

- HDPE has excellent corrosion resistance and is virtually inert. It does not need expensive maintenance or cathodic protection. It offers better overall resistance to corrosive acids, bases and salts than most piping materials.
- In addition, polyethylene is unaffected by bacteria, fungi and the most "aggressive" naturally occurring soils. It has good resistance to many organic substances, such as solvents and fuels.

5. Lightweight And Flexible

- Polyethylene pipe is produced in straight lengths or in coils.
- Made from materials about one-eighth the density of steel, it is lightweight and does not require the use of heavy lifting equipment for installation.
- It reduces the need for fittings, is excellent in shifting soils and performs well in earthquake-prone areas.
- HDPE resists the effects of freezing and allows bending without the need for an excessive number of fittings. Since HDPE is not a brittle material, it can be installed with bends over uneven terrain easily in continuous lengths without additional welds or couplings.

6. Joint Versatality

- HDPE pipes can be joint with various methods and if required it can re-joint easily without any cost. Some methods are here

  A - Butt fusion jointing

  B - Electrofusion jointing

  C - Compression fitting jointing

  D - Metal fitting jointing

- HDPE pipe repair need a minimal cost.

WHICH ONE'S BETTER, PVC OR HDPE?

When looking for a more suitable pipe for lower pressure, HDPE is more efficient. HDPE is softer and more bendable and has a tight bending radius. HDPE is a the right choice for both pressure and non-pressure piping application. HDPE is known for its flexibility, chemical stability, and high strength-to-density ratio. HDPE offers a leak-free system via heat fusion joints. While PVC is stronger and stiffer material, it makes it suitable for direct burial and trenchless installation. The stiffness of PVC pipe allows their direct connection to mechanical valves, non-plastic fittings and various other water and wastewater connections. One of the biggest issues with mechanically joined traditional pipes (PVC) is the high incidence of background leakage This is water that leaks out of the pipe through pipe joints. It is estimated that in the United States, about 14% of drinking water is lost each day due to background leakage! This represents more than 12 million gallons of water a year in a city of 100,000. HDPE pipes, and their fittings and connections, offer a distinct advantage in that they can be used to create leak-free joints that can prevent this issue.

HDPE IS PROVEN TO BE A GREENER PIPING SOLUTION. NOT ONLY IS HDPE MORE COST-EFFECTIVE TO INSTALL AND TRANSPORT, BUT IT ALSO TAKES LESS ENERGY TO MANUFACTURE, THEREBY REDUCING ITS ENVIRONMENTAL IMPACT. BECAUSE THE PIPING PRODUCT IS FUSED AND WATER-RESISTANT, THERE IS NO WATER LOSS OR RISK OF CHEMICALS AFFECTING THE SURROUNDING AREAS. MOST HDPE PIPING IS ALSO RECYCLABLE AFTER ITS INITIAL USE — USERS CAN CUT OUT THE FITTINGS OF AN OLD PROJECT AND THEN REFUSE THEM OVER AND OVER AGAIN, UNLIKE PVC FITTINGS WHICH ARE SINGLE USE.


“CHOOSE A RELIABLE, DURABLE, ECONOMICAL AND ENVIRONMENT FRIENDLY PIPING SYSTEM.”

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Monier has been in operation in Papua New Guinea (PNG) for over 60 years and is the single largest producer, supplier and distributor of construction materials and building products in the country.

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