

# Saudi Arabian Amiantit Plastic Products Manufacturing Company

PE / PVC T-Liner



**AMIA**NTIT MATERIALS

# Amiantit-Group of Companies

Contributing to infrastructure development

The Amiantit Group is a leading industrial organization that was established in Dammam, Saudi Arabia in the year 1968. Today, the Group has global strength and a track record of growth-oriented success in manufacturing various kinds of pipes, joints, fittings, tanks, rubber & insulation products and related accessories.

Strategic planning has made Amiantit an integral part of dynamic developments in countries across the globe and has put Amiantit on the world map with a name that is internationally recognized for manufacturing excellence and superior services.

Amiantit has proactively taken steps to strengthen operations and diversify activities, and has invested strongly in new technologies, products and applications, in order to meet global challenges in its markets that extend throughout the Kingdom of Saudi Arabia, the Middle and Far East, Europe, North and South America.

The Group has entered into a new era of growth and development through geographic expansion of manufacturing facilities, research, development and application of advanced technologies, consultancy, engineering and operation services for water management projects, aimed at exploiting the available market opportunities and maintaining industry leadership. With its competitive position, the quality and commitment of its people, and its excellent performance record, the Amiantit Group looks forward to achieving its vision of global leadership.



## AmPlas T-Lining A state-of-the-art product

Saudi Arabian Amiantit Plastic Products Manufacturing Company (AmPlas) was established in the year 2003 as a 100% subsidiary of the Saudi Arabian Amiantit Company. AmPlas has started manufacturing lining materials based on both PE and PVC that are used in protection of concrete pipes and structures against corrosive media. The technology is well approved and accepted in Europe as well as in the Middle East.



AmPlas is the first ever company in the world to produce the PVC T-Lining material in 2 mtr. width and PE T-Lining in 1.5 mtr. width. The manufacturing facility is an integrated plant in which the entire production line is automated from the compounding to the production of the primary lining material. The jointing of the PVC lining material is done by high frequency welding machines, and PE by hot air, extrusion welding or butt welding, which gives uniform jointing with very high jointing strength. AmPlas caters for the needs of customers in the entire Middle East region and beyond.

# T-Lining of unrivalled quality

## 1 Challenge:

Organic sulphates and inorganic sulphides are present in the slimes of sewerage flows and form the total sulphides present in the sewerage. A fraction of dissolved hydrogen sulphide is released into the sewer atmosphere as a gas.

A process of bacterial reduction occurs when the hydrogen sulphide in combination with the other gases, such as carbon dioxide, is progressively oxidised, reducing the Ph to the point where it splits off with water molecules to form sulphuric acid.

The powerful inorganic sulphuric acid reacts with hydrated calcium silicates and lime in the cement structure and reduces it to a soft swelling paste.

Conditions are optimal for this process of sulphide attack when there is high Biological Oxygen Demand, presence of sulphates (common in all water systems), higher ambient temperatures (quickening the kinetics of breakdown and reduction), and long detention times (flat grades - low velocities).

## 2 Solution:

T-Lining is the installation of a flexible sheet liner with locking extensions in reinforced concrete pipe and auxiliary structures to effectively protect the exposed concrete surfaces from corrosion for long periods of time that can be measured in decades.

T-Lining's projecting, moulded-in T-ribs are designed to allow concrete to flow around them during casting, permanently locking the liner into place as an integral part of the concrete substrate.

Because of T-Linings unique combination of qualities viz., outstanding chemical, abrasion and general resistance to any other physical effects, it

is recommended for a wide range of uses when protection against corrosion is necessary. There is no other better way to shield concrete other than T-Lining, which makes T-Lining a necessary precaution which should be incorporated during the project design stage.

## 3 History:

The concept of ribbed PE/PVC sheets started in the middle of the 19th century, when T-Lining was first introduced in the United States of America in the form of a ribbed poly-vinyl chloride sheet lining material specially designed to protect new and old concrete sewer pipes, concrete structures and tunnels against the destructive effects of hydrogen sulphide gas attacks and other forms of corrosion.

With a history of more than 150 years, T-Lining material has consistently withstood the ravages of time and harmful gaseous effects. It should be noted that, for recorded periods of over 50 years in actual service, pipes using T-Lining were not affected by corrosive elements and did not fail due to internal corrosion of the of the pipes' concrete surfaces.



## 4 Manufacturing:

T-Liner is based on compounded PE/PVC manufactured by AmPlas, Dammam, Saudi Arabia.



## 5 Product Advantages:

- Excellent resistance to a broad range of highly corrosive chemicals, gases such as hydrogen sulphide, acids, alkalis, and highly offensive salts.
- Permanent bonding to concrete substrates prevents delamination due to high groundwater back pressure. Flexible liner is able to bridge cracks in the structure without peeling of the T-Lining material.
- Strong sanitary bacteria and ever-growing fungus do not affect the T-Lining.
- Highly effective resistance to gas penetration.
- Unaffected by continuous exposure to high humidity and water.
- Joints are heat welded to form a continuous lining over the entire structure.
- If damaged, lining can be repaired quickly and easily by removing the damaged area and welding another piece in its place.

## 6 Product Properties:

### General

#### Back Pressure

T-Lining sheets have been cast into concrete and then tested with water pressure up to 40psi on the back of the liner plate without any evidence of rupture in the AmPlas T-Liner. 40psi back pressure would represent a ground head of approximately 85 feet.

#### Elongation

AmPlas T-Lining has a minimum elongation of approximately 200% for PVC and 600% for PE (ASTM Test D-412), and since it is locked physically into the structure of 2 1/2" centres, structural cracks which might occur are easily bridged.

#### Hardness

Shore Durometer D is approximately 50 for PVC and 60 for PE at ambient temperature (ASTM Test D-2240)

#### Chemical Properties Acid Resistance

Unaffected by continuous exposure to dilute solutions (at ambient temperature) of most mineral and organic acids including nitric, chromic, phosphoric and sulphuric. For use with concentrated solutions at elevated temperatures, a recommendation should be obtained from the local AmPlas representative.

#### Alkali Resistance

Resists solutions of alkaline chemicals such as calcium hydroxide, sodium carbonate, trisodium phosphate and sodium hydroxide when they occur as chemical waste products being transported at normal ground temperatures.

#### Salt Resistance

Resistant to all highly corrosive salts such as sodium chloride, copper sulphate, calcium chloride, ferric chloride and alum.

#### Solvent Resistance

Resists dilute solutions of alcohols as they normally occur in sewage wastes. However, AmPlas T-Lined sheets are not resistant to chlorinated hydrocarbons, esters, ketones, and similar solvents.

### **Petroleum Resistance**

Withstands resistance to petroleum products normally occurring in municipal waste disposal systems. However, AmPlas T-Liner is not designed for continuous exposure to high concentrations of petroleum products.

### **Vegetable and Animal Oil Resistance**

Resists repeated exposure to liquid vegetable and animal oils occurring as components of municipal or industrial wastes.

### **Fungus and Bacterial Resistance**

AmPlas T-Lining has been exposed to continuous fungus and bacterial action without any effect on the lining. It does not provide any sustenance for such growths.

### **General Properties Composition**

AmPlas T-Liner is composed of PE resin and pigment for PE liner and high molecular weight vinyl chloride resins combined with chemical resistant pigments and plasticizers. This completely inert mixture is extruded under temperature and pressure into a liner sheet with a minimum thickness of 0.065 inches (1.65 mm).

### **Imperviousness**

During the manufacture of T-Lining material the resin mixture is actually flowed, and all portions of the composition are flowed within the die to eliminate any imperfections. To further assure that AmPlas T-Lining sheets are uniform and free from blemishes, sheets are tested with a high voltage electronic holiday detector.

### **Application**

AmPlas T-Lining is placed on the inner forms of concrete structures or pipes. When the concrete is poured, the 'T's are embedded and locked into the concrete, thus making the liner an integral part of the surface.

Joining sections of the liner is accomplished by fusing a welding strip over the joint using a hot air welding gun. At high temperature, fusing of the two plastic surfaces is obtained, thus insuring continuity of the liner throughout the entire structure.

### **Maintenance**

The dense, glossy surface of the T-Lining will not absorb or regain precipitated or crystalline materials. Fungus growth and bacterial slimes do not adhere tightly. It is easily decontaminated and maintained in a sanitary condition.

### **Repair**

AmPlas T-Lining can be easily patched by removing the damaged area and welding another piece of T-Lining in its place. The repaired section is as fully resistant as the original sheet. Plain AmPlas sheets are supplied for repair, where needed.

### **Temperature Resistance**

AmPlas T-Lining is entirely suitable for all temperatures encountered in sewage. It will also withstand continuous immersion in certain chemical solutions at temperatures as high as 100° C.

### **Friction**

AmPlas T-Line has an appreciably lower friction coefficient than concrete.

### **Gas Resistance**

T-Lining sheets provide an extruded, pinhole-free lining which forms an effective barrier to gaseous penetration. More than 40 years of continuous exposure of any sulphide under pressure on one side of the sheet, and a lead acetate solution on the other, have shown no darkening in the lead acetate even after long exposure.



## Physical Properties.

All plastic liner sheets, welding strips and other accessory items, shall have the following physical properties when tested at 25° C ± 3° (77°F ± 5°)

Tensile specimens shall be prepared and tested in accordance with ASTM D 412 using Die B. Weight Change specimens will be 25mm by 75mm samples. Specimens for testing of initial physical properties may be taken from liner plate sheet and welding strip at any time prior to final acceptance of the work. 6.2.3 Liner plate locking extensions embedded in concrete shall withstand a test pull of at least 1800kg/m (100 pounds per inch) applied perpendicularly to the concrete surface for a period of one minute without rupture of the locking test shall be made at a temperature of 21° – 27° C (70° ± 80°C)

All plastic liner plate sheets, including locking extensions, all joints, corner and welding strips

| PE                                                    |                             |                                |
|-------------------------------------------------------|-----------------------------|--------------------------------|
| Property                                              | Initial                     | After chemical ageing Par.2.3  |
| Tensile Strength                                      | 15 Mpa min<br>2200 psi min. | 14.5 Mpa min.<br>2100 psi min. |
| Elongation at break                                   | 600% min.                   | 600% min.                      |
| Shore durometer (with respect to initial test result) | 1-sec. 50<br>10-sec. 40     | ±5<br>±5                       |
| Weight change                                         |                             | ±1.5%                          |

| PVC                                                   |                               |                                |
|-------------------------------------------------------|-------------------------------|--------------------------------|
| Property                                              | Initial                       | After chemical ageing Par.2.3  |
| Tensile Strength                                      | 15 Mpa min<br>2200 psi min.   | 14.5 Mpa min.<br>2100 psi min. |
| Elongation at break                                   | 200% min.                     | 200% min.                      |
| Shore durometer (with respect to initial test result) | 1-sec. 50-60<br>10-sec. 35-50 | ±5<br>±5                       |
| Weight change                                         |                               | ±1.5%                          |



shall be free of cracks, cleavages or other defects adversely offering protective characteristics of the material. The engineer may authorize the repair of such defects by approved methods.

The lining shall have good impact resistance, shall be flexible and shall have an elongation sufficient to bridge up to 6mm (1/4th inch) settling cracks, which may occur in the pipe or in the joint after installation, without damage to the lining.

## Chemical Resistance

After conditioning to constant weight at 43° C (110° F) tensile specimens and weight change specimens shall be exposed to the following solutions for a period of 112 days at 25° ± 3° C (77° ± 5° F)

At 28-day intervals, tensile specimens and weight change specimens shall be removed from each of the chemical solutions and tested. If any specimen fails to meet the 112-day exposure, the material will be subject to rejection.

| Chemical Solution                                   | Concentration             |
|-----------------------------------------------------|---------------------------|
| Sulphuric Acid                                      | 20%                       |
| Ammonium Hydroxide                                  | 5%                        |
| Sodium Hydroxide                                    | 5%                        |
| Nitric Acid                                         | 1%                        |
| Ferric Chloride                                     | 1%                        |
| Soap                                                | 0.1%                      |
| Detergent<br>(linear alkyl benzyl sulfonate or LAS) | 0.1%                      |
| Bacteriological                                     | BOD not less than 700 PPM |

## 7 Product Range:

### Liners

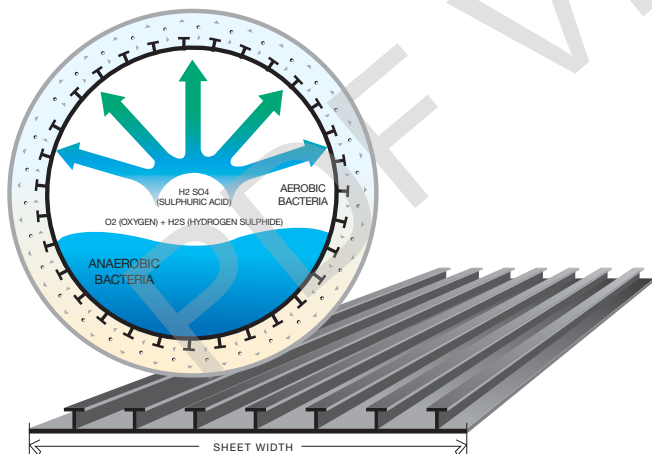
#### Sheet Liner

|             |                                          |
|-------------|------------------------------------------|
| Thickness : | 1.5mm-4.00 mm (PE)<br>1.5mm-2.5 mm (PVC) |
| Width :     | PVC – 2 meter<br>PE – 1.5 meter          |
| Length :    | As per customer requirement.             |

PE/PVC Liners can also be jointed and sent in Rolls or Tube form as per customer requirements.

Locking extensions liner will be integrally extruded with the sheet. Locking extensions shall be approximately 2 1/2 inches (64mm) apart and will be at least 0.375 – inch (9.5mm) high.

Amplas is the worlds first and only company manufacturing 2000 mm wide PE/PVC T-Lining sheets & 1500mm PE T-Lining sheet.

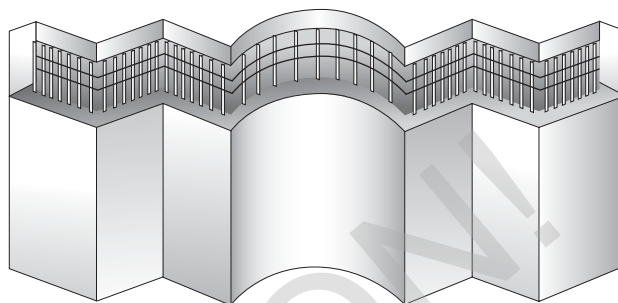


### Accessories

|                       |                                                 |                                |
|-----------------------|-------------------------------------------------|--------------------------------|
| Joint strip: Width :  | 100 mm                                          | ] (or as required by customer) |
| Thickness :           | 2.30 mm                                         |                                |
| Weld Strip: Width :   | 25.0 mm                                         | ] (or as required by customer) |
| Thickness :           | 3.2 mm                                          |                                |
| Corner joint strips : | Dimensions as required by customer              |                                |
| PE Welding Rods :     | Diameter 2,3 and 4 (or as required by customer) |                                |

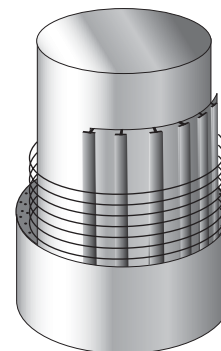
## 8 Applications:

- Pre-cast Concrete Pipes
- Concrete Structures and
- Tunnels



### Industrial Uses

- Bleach storage tanks
- Fertilizer storage
- Impervious membrane in acid tanks and pits
- Concrete ceilings in extremely corrosive environments



### Chemical Waste Disposal Lines and Trenches

- Acid picking wastes
- Pulp and paper
- Other similar corrosive liquids

### Water Treatment Storage Tanks

- Alum
- Fluosilicic Acid

### Waste Disposal and Treatment Plant

- Ferric chloride tanks
- Digester roofs
- Landers
- Setting basins
- Grit chambers
- Air or gas duct systems
- Wet wells
- Pipe and manholes
- Other similar areas and structures

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