

## FREQUENTLY ASKED QUESTIONS

### WHAT'S THE DIFFERENCE BETWEEN A WATER TANK & INDUSTRIAL TANK?

Industrial or Chemical tanks have a thicker wall based on a Hoop Design Stress calculations to determine the specific gravity (relative density) rating. These tanks are also designed with consideration to the criteria developed by Australian Standards (AS/NZS4766:2006)

Our poly water tanks are not designed for chemically severe applications. The water tanks are a thinner walled design that is based upon the normal service conditions expected for water tanks in rural or urban service conditions. Water tanks are typically gravity feed, while industrial tanks are normally filled by way of pumps.

To determine which tanks you need, (Industrial or Water) will depend on the application. Our Chemical Resistance chart outlines some of the more common chemicals that are in use.

Another determining factor is fittings required on the tank. If the fittings required are other than the standard brass outlets and PVC overflows offered with Water tanks, then the Industrial (Chemical) tanks should be used. Contact your Bushmans sales consultant to discuss the most suitable solution for your application

### WHAT RANGE OF FITTINGS CAN BE INSTALLED?

Multiple fittings, in a variety of materials, at many locations can be added to tanks in our Industrial range. We can plastic weld inlet and outlet fittings up to 50mm in diameter, as standard. Fittings which require a hole cut into the tank side wall greater than 50mm diameter can be installed, but these require appropriate engineering assessment. Our range of standard fittings available can be obtained from your Bushmans Sales Consultant

### WHICH POLYETHYLENE IS USED?

We manufacture our tanks from linear polyethylene (MDPE) resins. The density of the pre-processed natural unpigmented polyethylene is about 0.938g/cm<sup>3</sup>. Polyethylene resin is also commonly classified as :

Low Density	LDPE	0.910 – 0.925 g/cm <sup>3</sup>
Medium Density	MDPE	0.926 – 0.940 g/cm <sup>3</sup>
High Density	HDPE	0.941 g/cm <sup>3</sup> +

Please refer to the Chemical Resistance Chart to determine if the liquid you want the tank to hold is suited for your application. Or call your sales consultant for assistance.

### ARE YOUR TANKS FOOD CONTACT APPROVED?

The polyethylene resins used to manufacture our tanks comply to the specifications contained in Australian Food Contact regulations - AS2070

### WILL MY TANK BULGE?

Polyethylene is a flexible material. It becomes more flexible as it is heated. It will therefore bulge more at an elevated temperature than at room temperature. As temperature increases the physical properties of the polyethylene will start to reduce, from the original tested results. Expansion and contraction of a poly water tank is not unusual.

If you expect the contents of the tank to operate continuously at an elevated temperature, typically you would require a tank with a thicker wall (with a higher Specific Gravity rating) to ensure you maintain a safe tank design over the life of your tank.

Advise your sales consultant if you believe the service conditions of your tank will be at elevated temperatures.

### WHAT IS THE MAXIMUM TEMPERATURE THAT YOUR TANKS WILL WITHSTAND?

Poly storage tanks have their physical properties tested and reported at an internationally recognised standard temperature of 23<sup>0</sup>C. This means that the contents of the tank should not exceed 23C, to ensure the tank maintains its original performance expectations. Higher operating temperatures are possible, as long as the tank design incorporates the effects on the polyethylene over the design life of the tank

Any application with a continuous service temperature above 40C is not recommended for polyethylene tanks.

### CAN YOUR BUSHMANS TANK BE PRESSURISED?

No, our tanks cannot be pressurised. They are all designed to operate at atmospheric pressure.

### **WHAT IS THE WALL THICKNESS OF YOUR TANKS?**

Because any given size tank will have varying wall thicknesses requirements, a single wall thickness number is not the best gauge for determining the quality of a tank. The lower sidewall is the heaviest or thickest part of the tank. As the head pressure is reduced going up the wall of the tank, the thickness of the tank can be reduced. This relationship is outlined in the Australian Tank Standard (AS/NZS4766) tank design formula.

The actual weight of the tank is also not a good comparison when shopping for tanks. Lower density polyethylenes and lower grades of polyethylene require heavier walls to compensate for the lower physicals of the polymers. Just because a competitor may use more material in the tank does not make it a better tank. The quality of the tank design is determined by the polyethylene, mould design and the manufacturing control capability of the rotational moulder.

### **WHAT CHEMICALS CAN I STORE IN BUSHMAN TANKS?**

Refer to the Chemical Resistance Chart or contact your chemical supplier to see if their product is compatible with Linear-Low Density polyethylene (LLDPE). If they do not have data for LLDPE, the closest match to our LLDPE would be HDPE.

If your chemical supplier cannot answer your question, call your Bushmans sales consultant and we will research it for you. Try to have as much information available as possible such as the service temperature of the product, the percent concentration of product (Eg: 21°C, Hydrochloric Acid, 10%) etc. You will often find that the chemical manufacturer can make the best recommendation. Their actual experience is often the best source. The manufacturer will be listed on the chemical Product Data or MSDS sheet.

Please remember that the information provided by Bushman Group Pty Ltd with respect to chemical resistance is only to be used as a guide for application and is **not** to be taken as a guarantee of ultimate field performance. If there is any doubt, we would always recommend that you undertake field trials with a tank and your chemical to be positive of secure storage. Real life testing will provide much more accurate performance results than small scale laboratory testing.

### **IS VENTING IMPORTANT?**

When a mechanical pump is used to fill your tank, it typically does not cause excessive pressure upon the tank. However you must ensure that you confirm the venting capacity of the tank you select is equal or exceeds the air/liquid cubic volume coming from the filling source, for adequate margin of safety and increased tank life.

### **WHAT IS THE GUARANTEE ON YOUR BUSHMAN TANK?**

Bushman Group Pty Ltd guarantees to the purchaser for any manufactured product proven to be defective in material or workmanship within 5 years from date of original invoice from factory. Any accessories supplied, but not manufactured by Bushmans, will be covered by the relevant manufacturer's guarantee. The guarantee does not apply to colour, which may in time fade or change.

Contact your sales consultant on questions regarding our guarantee for your specific application.

### **ARE YOU BEING OFFERED A WRITTEN WARRANTY OR GUARANTEE?**

Bushmans offer a Fix or Replace Guarantee for a period of up to 5 years for industrial tanks. We recommend that you read the tank manufacturers written guarantee document for complete details.

### **WILL COLD TEMPERATURES DAMAGE MY BUSHMAN TANK?**

Freezing temperatures will not have an affect on a polyethylene tank, however if there is liquid in the tank, make sure the freezing liquid has enough head room to expand.

Quality rotational moulding manufacturers perform a test called "Low Temperature Impact Resistance". This is a test required by AS/NZS4766 Australian Tank Standard. We conduct our impact test at -40C temperature. This test is one of the key tools we use to confirm that your polyethylene tank has been properly processed.

While our quality assurance team undertake impact testing at this low temperature, we do recommend that you take all efforts to avoid impacting the tank, especially with sharp items, at any temperature.

### **DO POLY TANKS SPLIT AT THE SEAMS?**

Actually there are no seams in poly tanks. Lines that may be visible on the outside of the product that look like joins are actually where the two parts of a mould join together, however the product isn't made from two sides joined together, so the tank forms as one solid piece during the process.

## CAN YOUR BUSHMAN TANK BE BURIED?

Tanks specifically designed for above ground use cannot be buried because the weight of the ground around the tank can cause the wall to collapse. If you have an application for a below ground tank we do have a few specialised water tanks available that are designed for below ground use.

## HOW MANY YEARS WILL MY TANK LAST?

There are many variables that can have an effect on the life of a polyethylene tank which make it difficult to give a definite 'life' period for a polyethylene tank.

The type of material being stored in the tank, its concentration, and temperature are some of these important variables. While Bushmans offer a 5year Guarantee for its Industrial tanks, most tanks will outlive the guarantee period.

Special considerations - some chemicals will have long term affects on the polyethylene and may require special considerations. As an example, sodium hypochlorite will degrade from UV exposure and elevated temperature. As it degrades it can build up sediment in the bottom of the tank. If this sediment is periodically flushed from the tank it will extend the life of the tank.

Installation and Piping - The number one reason for tank failures is due to improper installation. It is important that you design and install your pipe work using good installation practices. This is your responsibility. Having flexible connections that compensate for the expansion and contraction of the tank is critical to ensure you maximise the service life of your tank. These installation practices will include the provision of adequate support for pipe work, or additional fittings that may impose any stress on the tank.

Do not use the tank wall, or roof, to structurally support your pipe work, or ancillary equipment.

Is the tank used indoors or outdoors? The amount of U.V. exposure will be based upon the time of exposure and the closeness of the installation to the sun (elevation). What part of the country are you in? Tanks used outdoors in areas subjected to more intense sunshine will be more affected by the sun. UV rays will have a detrimental effect on the life span of all poly tanks.

Colour. Black tanks will last longer than natural tanks in an outdoor environment. Coloured tanks will last longer than natural (unpigmented) tanks, but black tanks will resist UV attack longer because carbon black pigments naturally perform better in polyethylene than other colour pigments.

Storage or process - Is the tank a holding tank or a processing tank? A tank that is continuously cycled will see more stress than a tank that remains at one level or close to one level for extended periods of time. Tanks with excessive agitation may also be exposed to undue stress.

Here is an example of some of the things that can be avoided in a tank installation, and will shorten the expected service life of a tank.



service life of a tank.

Here we have rigid plumbing into the base of the tank. This does not accommodate the expansion that takes place in this area as the tank is filled. This will increase the stress on the outlet areas.

Additionally, a ladder has been placed on one of the outlet pipes which increases the load on the tank at this position.

We know that there is a high bending force at the junction of the tank wall and the base and that this needs to be well supported.

However, in this example, there is no support for part of the tank base, while another part is supported by stones which induce high, point loadings which in turn increases the stress in this area.

This example shows that while a lot of time and money can be spent on purchasing a good quality manufactured industrial tank, the absence of good installation considerations will result in poor tank performance.

### WHAT IS A FLEXIBLE JOINT?

Outlets and inlets on the tank must have a flexible joint connection between the tank and the plumbing or rigid pipe work. This is vital to absorb movement and stress, isolate pump vibration, accommodate pipe misalignment, and minimise surge pressures. It is the responsibility of the tank purchaser to install the appropriate flexible connections between the tank and the plumbing. This is important as our guarantee is only valid if the installation has appropriate flexible joint connections.

The example image shows a spherical rubber expansion joint. These can be made from chemical resistant materials like Neoprene, Nitrile, and EPDM that should ensure compatibility with the liquid being stored in the tank.



### WHAT IS AN OXIDISING AGENT?

Oxidising agents are not good things for the tank. Chlorine (Sodium Hypochlorite) is an example of a known **Oxidising agent**. The polyethylene chemical bonds are attacked. Its effect will become more pronounced as the heat and or pressure increases. The concentration of chlorine, size and often thickness of tank, as well as temperature, will influence the performance of plastic tank. Typically, we do not really know the operating environment, so it is very difficult for Bushmans to confirm that chlorine is **RECOMMENDED** for an application. Customers who have experience with the chemical already, are in the best position to determine if the tank is suitable. Oxidising agents will affect the long term performance of a tank, and while the chemical may be on the Chemical Chart as satisfactory, it means the tank needs to have sufficient safety margin built in to counter the oxidising effect.

### HOW DO YOU INTERPERATE CHEMICAL RESISTANCE CHARTS?

Chemical “resistance” and “compatibility” are synonymous terms used in relation to the ability of a plastic to function in different environments. In regards to polyethylene chemical storage tanks, chemical resistance encompasses the total effect a product would have on a tank. The factors that make up the overall compatibility of a chemical to a rotomoulded tank are (1) chemical attack, (2) absorption or permeation, and (3) solubility and stress crack resistance.

#### **Chemical Attack**

By definition, chemical attack involves an actual chemical reaction with the plastic. This can be a breaking of molecular chains and/or an addition of chemical groups to the molecule. For example, in the case of an oxidation reaction with polyethylene, both occur with the addition of carbonyl groups. This causes an eventual loss of properties to the point that a tank would not be serviceable.

Polyethylene in general is one of the most inert plastics available. Very few chemicals react with polyethylene and with those that do, the rate is relatively slow.

#### **Permeation**

This involves the physical absorption of the chemical into the polyethylene. If this is a volatile chemical, then an actual loss of the product can occur as the chemical vaporizes from the outer wall of the tank. The amount of absorption is generally limited to 3 to 7 percent by weight of the polyethylene. Also, the loss of volatile products is relatively small. The thicker the wall, the lower the rate of loss.

#### **Absorption**

The absorption of a product into the wall of a tank will cause more property changes. The tensile strength is reduced approximately 15 to 20 percent and stiffness approximately 20 percent. Normally, this does not affect the utility of a tank or prohibit the application. The property losses due to absorption are typically offset by increasing the design wall thickness of the tank.

### ARE YOUR PLASTIC TANKS DESIGNED FOR THE AUSTRALIAN HARSH SUNLIGHT?

No matter what you read, every material used to make water tanks has an expected life span that will be affected by its manufacture, quality and exposure to the environment. Bushmans tanks are designed to provide maximum protection for the Australian environment. Black typically, will provide the maximum UV protection, but will absorb the maximum heat. All our tanks are made from polyethylene that meets or exceeds the minimum Ultra-Violet protection requirements for polyethylene storage tanks – specified in AS/NZS4766:2006

### CAN YOU PAINT POLY TANKS?

We do not recommend painting. The paint will not permanently adhere to the tank. When you paint polyethylene it just sits on surface, no bond. There are customers who have painted their tanks, however we do not know the details on preparation, nor how permanent this surface coating solution is.

## **A QUICK SUMMARY OF SOME OF THE HANDLING AND INSTALLATION ISSUES TO BE AWARE OF.**

Bushmans design and manufacture your tank to give you long, trouble-free service. While our tanks are extremely durable, improper handling and installation can result in damage to the tank, fittings, and accessories. Failure to comply with handling and installation instructions will void all warranties.

Upon delivery, inspect your tank immediately for defects or shipping damage. Any discrepancies, or product problems, should be noted on the driver's delivery receipt book.

When unloading your tank from the delivery truck, avoid its contact with sharp objects. Forklift blades can cause significant damage if proper precautions are not taken. Do not allow tanks to be rolled over on the fittings. Large storage tanks, whenever possible, should be removed from truck bed by use of a crane or other suitable lifting device. (Lifting device is at purchasers expense) Keep unloading area free of rocks, sharp objects, and other materials that could damage the tank. If tank is unloaded on it's side, carefully brace to prevent rolling so external fittings are not damaged.

Support the bottom of tank firmly and completely. Concrete pads provide the best foundation, and are recommended for industrial tanks. Prepare a reinforced concrete pad that is level and greater than the diameter of tank. Remember that 22,000litres of water weighs 22,000kgs, while 22,000Litres of molasses weighs about 31,500kgs

However, in the event you deem that the base loading bearing factors are not important, prepare a ring on the ground greater than the diameter of the tank so that no part of the tank is bearing on the ring edge. Fill is to be consolidated with 50–75 mm of sand or crusher dust on top surface. You must maintain the consolidated fill in good condition during the service life of the tank. Place the tank onto the prepared pad. (If positioning requires a crane, this must be at purchaser's expense)

Steel support stands concentrate the loaded tank weight onto the stand leg pads. It is recommended that stands be mounted on a concrete base. Bolting of stands is necessary to prevent movement due to agitation, wind, seismic loads and accidental contact. It is the purchasers responsibility to ensure that support structure is designed adequately for the purpose.

Do not mount heavy equipment on top of the tank. Fully support pipes and valves, so there is no external weight loading on the tank.

DO not rigidly pipe tanks. Use expansion joints to prevent damage at fittings from the differential expansion and contraction of the piping and tanks.

Tanks are designed for use only in the atmospheric storage of chemicals, never for vacuum or pressure applications.

Refer to the Bushmans capability chart (Chemical Resistance Chart) as a guide to suitable chemicals to store in your tank. Be certain tank, fittings, and gasket material are compatible with chemicals at ambient operating temperatures. Contact our support staff for information on chemicals not listed, or when uncertain conditions exist.

Confined spaces must be considered hazardous. Do not enter tank without first taking proper precautions.

Tank sizes as listed are nominal and calibrated gauges, when supplied on moulded tanks provide an indication of volume. Polyethylene tanks expand and contract which will affect volume. The degree in which this occurs depends on the size of the tanks, wall thickness, specific gravity (or relative density) of contents, temperature of contents and ambient temperatures.

**WARNING:** It is the installers responsibility to follow all appropriate Worksafe, OH&S and government safety regulations. The following information has been provided as guidelines for tank use and installation. It does not address safety issues which may be present at specific tank installation sites. Use appropriate safety practices when handling any tank and/or using heavy equipment.