



Vacuum & Pressure Liquid Waste Tanks - Steel or Aluminium ?

When deciding whether to specify a steel or aluminium tank for your next liquid waste road tanker project, it is important to be aware of a few basic concepts.

TARE WEIGHT

Aluminium is lighter than carbon steel and offers a tare weight benefit.

CAPITAL COST

The up front capital cost of an aluminium spoils tank is considerably higher than the up front capital cost of a high-strength carbon steel spoils tank.

STRENGTH & HARDNESS

The design strength of carbon steel for pressure and vacuum application is almost 3 times the design strength of aluminium. Aluminium tanks are built thicker for this reason. Carbon steel is harder than aluminium and is better suited for abrasive waste products.

ASSET LIFE – FATIGUE RESISTANCE

Steel can exhibit an infinite fatigue life under appropriate design loads whereas aluminium does not. Under cyclic pressure and vacuum conditions, the fatigue life expectancy of a carbon steel vacuum tank is therefore greater than the fatigue life expectancy of an aluminium vacuum tank.

PRODUCT CAPABILITY

Products transported in aluminium tanks must be kept within a narrow range of pH values (usually 4.5 to 8.5) to ensure corrosion rates are kept to a minimum. Outside of this range (lower or higher pH values) aluminium corrosion rates increase significantly. Aluminium will react with organic muck soils and clay based soils regardless of the pH range. Aluminium is highly reactive with incompatible products resulting in rapid corrosion and erosion rates (reduced hold time).

Carbon steel tanks are alkaline and therefore favour alkaline conditions. Products transported in steel tanks should be kept within the range pH 4.0 to 14. In the range of pH 4 to pH 10, the corrosion rate of steel (iron) is relatively independent of the pH of the solution. For pH values above about pH 10, the corrosion rate of carbon steel will reduce as pH is increased. If you require a tank that can handle the broadest range of pH values, a high-strength carbon steel tank is better suited.

RESISTANCE TO GALVANIC CORROSION

Aluminium is more anodic than steel and in the presence of an electrolyte solution is more susceptible to galvanic corrosion.

STRESS CORROSION CRACKING

Higher-strength aluminium alloys are susceptible to stress-corrosion cracking because of their magnesium content whereas carbon steel offers better resistance and allows higher operating temperatures. Air & Gas Industries does offer aluminium tanks constructed from Grade DNV 5083-H116 aluminium alloy. High-strength 5000 series aluminium alloy is selected for our tanks because of its ability to maintain exceptional strength in the heat affected zone after welding.

Avoid Be careful using tanks manufactured from aluminium alloys outside of the 5000 series. Alloys outside of the 5000 series can return to an annealed condition after welding causing tensile strength reduction of up to 50%.

For more information on our services and products contact us:-



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