Applying durability standards for longer tank inspection intervals

How API standards and Hempaline Defend linings enable longer service intervals for ground storage tanks.

Ground storage tanks are among the most critical elements at any petrochemical facility. Due to the highly corrosive liquids and gases stored within these tanks, they need an extremely durable lining system to protect them against corrosion. This system must be internally inspected at regular intervals – a costly procedure that requires the tank to be taken out of service. Therefore, any lining system that can extend intervals between inspections can be extremely valuable for asset owners and operators.

This article explains how your choice of a Hempaline Defend lining system can extend inspection intervals in compliance with API standards to increase tank uptime and reduce your inspection costs

The API standard for ground storage tanks

The American Petroleum Institute (API) standards and guidelines are used globally across the oil & gas sector. The API has developed over 700 industry standards to improve and enhance operational safety, environmental protection and sustainability at oil & gas facilities.

The API has clear standards and recommendations for ground storage tanks:

- API 652 Recommended Practice for the Lining of Above Ground Petroleum Storage Tank Bottoms
- API 653 Standard for Tank Inspection, Repair, Alteration, and Reconstruction

Understanding the requirements and recommendations in API 652 and API 653 can help you to extend intervals between internal tank inspections.

Protecting tanks with hydrocarbons

API 652 is a guidance document for new and existing storage tanks that hold hydrocarbons. It informs the selection of lining materials, as well as methods for surface preparation and application, curing times and inspection intervals. Unlike API 653, API 652 is not a standard but a ‘recommended practice’. However, being referred to in API 653 makes API 652 ‘mandatory’.

Extending inspection intervals on ground storage tanks

As a starting rule, API 653 states that an internal inspection must be performed on a ground storage tank no later than 10 years after the tank was built or refurbished. However, this period can be extended with the use of specific linings and safeguards.

- Adding cathodic protection on the soil side of the tank bottom to monitor underground corrosion adds a further 5 years to the inspection interval.

- A 12-year initial service interval can be achieved with a solvent-free coating system, such as Hempaline Defend 400 or Hempaline Defend 630. This can be extended to 17 years when combined with cathodic protection.
- A 15-year initial service interval can be achieved by a combining a standard lining system on the tank walls and roof with a reinforced system on the tank bottom floor, such as a thick film lining containing glass flakes (i.e. Hempaline Defend 640), or a thin film fibre-glass reinforced plastic (FRP) laminate system (based on Hempaline Defend 400 or Hempaline Defend 630). The service interval can be further extended to 20 years with the use of cathodic protection.

In-service external inspections

As well as internal inspections, the API 653 standard requires an in-service external inspection every five years. This involves an ultrasonic thickness inspection of the tank shell, which does not require tank shutdown or disrupt tank service. The ultrasonic thickness inspection determines the thickness of the remaining steel on the tank bottom floor in order to establish corrosion rates. Data from the internal and external inspections are used to calculate when the next internal inspection is required.

Reducing tank corrosion with Novolac linings

When determining the correct lining system for tank bottom floors in line with the API standards and guidance documents, the content of the tank is an important consideration.

The more aggressive the stored chemical (sour crude oil, fuels contaminated with water, such as acids and alkalis and crude oil containing seawater), the faster the corrosion takes place and the more severe the corrosion is likely to become. Operating temperatures, in particular high temperatures, also impact the corrosion rate. Repairing very corroded tanks can be challenging, with complex surface preparation that requires the tank to be removed from service for a longer period.

In general, an epoxy Novolac lining system will provide higher chemical and temperature resistance due to the higher crosslinking ratio. Epoxy Novolac coatings, such as Hempaline Defend 630, are therefore recommended. As well as extending inspection intervals, these coatings can reduce costs and downtime if repair is needed.

Find out more

- Explore our Hempaline Defend epoxy Novolac coatings site
- Contact Hempel for more information and advice