Guidance for surveying and inspecting bunds

The scope of this document is to provide guidance on maintaining and inspecting a bund with respect to U.K. HSE guidance on secondary containment. This article is designed to help site managers ensure their bunds are regularly maintained and fully functional.

Regular maintenance and inspections of existing bunds is an important feature in site safety. According to the HSE, bunds should be kept in good condition: "Maintenance of bunds is an important aspect, often overlooked, particularly in remote locations. A system of inspection should be in place to ensure the integrity of the bund."

Download a copy of our bund inspections criteria. Please note that these guidelines are recommendations and should be adapted for specific projects. We cannot be held responsible for any site-related incidents.

1. Aim

The aim of this document is to outline a standard for ensuring that water discharged to drain from any bunds does not contain substances in excess of prescribed levels. This involves the inspection of all bunds on site that provide secondary containment around storage and processing vessels, including those which house drums and barrels. This document recommends that all items are included in a bund register.

Please note that this document is intended to cover the U.K. but could be applied internationally where appropriate.

2. Background

What is the term 'bund' referring to?

Bund shall mean any external structure that provides secondary containment around any tank or vessel used for the storage or processing of liquid. This shall also include bunds set below ground level to permit drainage both indoor and outdoor. The bund is in place should a severe failure of the primary containment vessel occur. The bund is designed to protect personas in the surrounding site from immediate exposure and to prevent contamination of the ground surrounding the bund, as well as that of any water leading to drains, streams or rivers.

Drains include road gullies, grids, rodding eyes and chambers associated with the drainage system.

The term 'lining' refers to the internal coating of a bund, typically applied to the floor and wall as a means to prevent damage to the underlying concrete or brick structure via ingress.

What is the purpose of a bund?

Bunds are designed to provide secondary containment to capture the content of vessels/drums/IBCs in the event of severe failure of the primary containment vessel. This in

turn protects against contamination of the surrounding ground and of surface water leading to drains, streams of rivers.

To be functional bunds should perform the following requirements

- Be impermeable and resistant to any material stored within the primary containment vessel or tank, such that in the event of a breach, that material would be adequately contained by the bund - this is particularly important for hazardous chemicals
- Possess no drainage systems; they should instead divert liquids to a contained collection point prior to controlled removal
- Direct pipework within bunded areas with no penetration of contained surfaces.
- Accommodate leaks from tanks and fittings.
- Possess a capacity above 110% of the largest tank or 25% of the total number of tanks, whichever is greater, in line with HSE recommendations
- Undergo routine, scheduled visual inspection, whereby any debris removed, and contents extracted once contamination has been ruled out.
- Where not frequently inspected be filled with a high-level detection system (probe and an alarm) as appropriate.
- Be subject to a routine programme of inspections (normally visible, and but extending to water testing where structural integrity is in doubt)

Addition guidelines, regulations and recommendations can be found in the references section of this article.

Bund integrity

Bunds are commonly built from a combination of concrete and mortar. Whilst providing structural support, concrete is porous by nature, making it susceptible to breakdown and leakage. To make the bund impervious to any chemicals it is intended to contain, the inner walls and base of the bund should be covered with a protective lining. This lining should be chemically resistant and waterproof, ensuring that should a leak occur in the primary containment vessel, the bund is able to contain it prior to disposal.

Bund linings

A bund lining is defined as the internal covering protecting the underlying bund wall and base substrate. It should not be confused with a ‘coating’, as that describes the outer covering, which in the case of a bund, is the external wall - a feature that does not require enhanced protection.

Whilst a range of protective bund linings exist, from fibreglass to various epoxies and polyurethane-based resins, there is no “one size fits all” and bund linings should be selected to be compatible with the chemicals contained within the primary containment storage tank. This is to ensure that should a leak occur then the lining of the bund will not lose its permeability.

For bunds, linings are applied to the inner walls and floors of many bunds and serve to provide the sustained and enhanced containment of any liquids stored on the primary containment vessel.

3. References

Bunding regulations

- COMAH Competent Authority Work stream – Secondary and Tertiary Containment of Bulk Hazardous Liquids at COMAH Establishments
- Primary containment regulations for storage of flammable liquids
- HSE secondary containment regulations
- Fuel storage site storage
- Bund design standards

Bund lining, surveying and inspection services

- Linings and coatings
- Bund linings and surveys specialists
- GRP lining specialists

Presentations on Bund linings and coatings

- Bund lining systems
- Fibreglass (GRP) bund linings
- Creating a GRP lining
- Fibreglass linings and coatings

Case studies on bund failures

- When bunding costs too much: A COMAH inspired case study
- Loss Prevention Bulletin

4. Inspecting a bund

Who is responsible for ensuring bund compliance?

Site managers are responsible for ensuring that each bund complies with maintenance and operation requirements. Site manager responsibility may be delegated to a trained member of staff. These responsibilities can be summarised as follows:

- Site managers should generate instructions on how to safely discharge bund contents. These instructions should cover tests to check for the release of any contents inside of the vessels.
- Site managers are responsible for the preparation and maintenance of a register of bunds and sumps on the site.

- Site managers are responsible for generating a scheme of inspection of each bund and sump.
- Site managers are responsible for carrying out the schemes of inspection for each bund and sump on the agreed frequency, and detailing within the report the remedial work required, together with a review of the inspection frequency.
- Site managers are responsible for informing the asset of the remedial work required and for agreeing with the asset details of the work required.
- Site owners are responsible for financing the repairs arising from the inspection and for planning the opportunity to carry out the work.

Bund Registers

To track the status and condition of any site bund, a register should be created. All bunds should have clearly displayed identification codes that are easily visible.

The bund register should be based on the document below, which outlines....

Bund Inspections

Company inspections

Bunds and any additional equipment must be inspected regularly with any deviations or observations being logged in the Bund Register. Associated equipment must be subject to scheduled inspections that provide detailed corrective action where required. Inspection should be subject to a site review and risk assessment.

Regulatory inspections

Regulatory inspections occur at set intervals and seek to assess and review the site bund ... These will aim to assess bund integrity, review the bund register and to make any recommendations. A core feature of this is bund integrity testing. Examples of regulatory bund inspections have been provided.

Disposing of liquids contained within the bund

Site guidelines should be in place detailing procedures that would ensure the safe, compliant disposal of liquids contained within the bund. It should be noted that external bunds are prone to collecting rainwater and it is advisable for bund contents to be checked for contamination prior to disposal. Indoor bunds containing liquid are likely to contain spilt materials.

5. Template Bund Inspection form

Bund identification code	Insert the code detailed on the bund	
Bund purpose	Briefly describe the purpose of the bund inspection	
Date of inspection	Insert date	
Date of last inspection	Insert date of prior inspection	
Name of inspector	Name of qualified inspector	

Note: please ensure a risk assessment has been completed pertaining to safe bund inspection. Ensure that any inspector assessing the bund has been adequately trained and the relevant SOP read.

Question	Description	Answer
What recommendations and requirements were undertaken following the previous inspection?	Consider the previous report and whether actions were followed up on. Review and report deviations and modifications accordingly.	
Is there standing liquid in the bund?	It is important to distinguish between rainwater and leaked chemicals. In the event of rainwater, technicians should take a sample and arrange an inspection. Careful consideration should also be taken to ascertain whether the liquid within the bund is not rainwater, as this would indicate a possible leak or breach from the primary containment vessel. Be prepared to seek technical and scientific advice if required - particularly if hazardous chemicals are used.	

What volume of liquid is inside the bund?	This can be determined by using a measuring gauge but can also be estimated visually. In certain situations, a high-level alarm may be automatically triggered indicating that the liquid volume has exceeded a set level.	
Percentage full?	The bund capacity should be designed to accommodate at least 110% of the largest tank or greater than 25% of the total tank capacities. The volume of any liquid inside the bund should be converted into a known percentage of the overall capacity of the bund.	
Is any of the equipment and piping within the bund leaking	Look for tank, pipe and pump staining or dampness. Also look for puddles on the base of the bund in the event of slow leaks.	
Is there any litter, ice or other debris in the bund which could block suction to bund?	Classic examples include leaves, dirt and other types of biological matter. If work has been performed on the bund recently, ensure that the drain is free of concrete and mortar debris. Note that: in colder periods, ice is likely to form, blocking any removal systems. This is why it is important to regularly inspect and remove rainwater, which could significantly hamper the capacity of the bund and could cause it to overflow, particularly if the	

	substance held within primary storage is not compatible with rainwater.	
Does the bund emptying procedure operate effectively?	This includes any pumping systems, and inspectors should look out for unexplained pressure losses, pump equipment failure, delayed flowrates times. Inspectors should also be aware of blockages in the drainage outlets - usually a grating barrier is in place to prevent leaves and debris from entering it and blocking it. This could be leaves from adjacent trees, or concrete debris if damage has occurred to the bund wall or floor.	
What condition is the bund wall and floor in?	Note that this stage of inspection should only be performed once the bund has been drained and any surfaces dried out. What to look for: insert the details from the main page. Perhaps ppt. What type of work is required to	
Has the purpose of the bund changed?	Company objectives may require that the type and volume of materials held within the primary containment vessel may change. This could require the bund to be re-designed and a new lining installed that is chemically compatible with the tank contents or rebuilt an existing system to accommodate larger volumes.	
Condition of the bund	Is any remedial action required to repair or refurbish the bund?	

Condition of any equipment in the bund	Is any repair or replacement work required on the equipment within the bund? Is that equipment fit for purpose? Are there any signs of leaks, corrosion and lagging missing?	
General comments and observations	Detail any recommendations and observations outside of the scope of this survey	

This document has been created by Strandek®, specialists in applied waterproofing and chemical coatings and lining solutions. It is intended as guidance If you would like to find out more about our services, please call us on **01633 250652** or send us an enquiry via info@strandek.co.uk.