



<b>Main Points:</b>	
Clean slats annually	Inspect slats annually for sagging
Inspect safety manhole covers annually	NEVER enter slurry tank without breathing apparatus and buddy on rope
Safety manhole cover and slat costs less than €1,000 to replace.	

Slats and manhole covers are not lifetime items. They need to be replaced before they fail. Slat or manhole cover failure can be an expensive way to discover that replacement is required. To avoid broken legs or worse still animals or yourself in the slurry tank, all slats and manhole covers should be carefully inspected for cracks and sagging and replaced as necessary. Attempting to rescue animals from slurry tanks is extremely dangerous and has resulted in the loss of multiple human lives.

### **Inspection**

Slats and manhole covers are only designed with an expected working life of 20 years. This means that you should get 20 years life without any major repair work required, however, not all slats will reach this length of life, while others will exceed this target by many years. The same goes for safety manhole covers.

To inspect slats use an inspection camera that is waterproof and fitted with a light – this allows inspection of the slats without having to empty or enter the tank. With the inspection camera it is possible to see the condition of the underside of a slat without moving it.

Slats are designed to bend under load. The maximum deflection without causing permanent damage is 1/120<sup>th</sup> of their length. However, in normal use they won't need to bend, and shouldn't be caused to bend, by this amount. A sound slat will spring back after the load is removed. If all is not well, the slat will eventually lose its resilience and permanently sag relative to its neighbours.

If slurry has been allowed to build up to the under side of the slats, the life of the slats will be significantly reduced, as both the concrete and reinforcing steel will have suffered greater levels of corrosion than in tanks where the free board has not been compromised.

### **Annually**

Every year thoroughly clean the slatted floor, including any external manhole covers and examine the entire floor for sagging, cracking, rust staining and spalling of concrete, i.e. breaking of layers or pieces of concrete from the surface. Assuming the slats were laid evenly in the first instance, the laying of a straight edge across the centre of the slats will indicate which slats have sagged. Any cracks on the upper surface can easily be seen, as they dry out more slowly. Spalling of concrete is most likely to occur on the underside of the slat.

### **Single Slats**

For single slats, suspect slats should be lifted, power washed and examined for cracks. Follow a safe method when doing this work, otherwise someone will fall into the tank or some slats could end up in the tank.



## Slat Inspection – an essential safety procedure

When single slats are turned over for examination they should be handled carefully and supported at the centre as well as near both ends. The tell tale signs that slats are in a dangerous condition are significant cracks lengthways and crossways on the side and underside. There may also be evidence of rust staining coming from cracks or spalling of the concrete in advanced cases of deterioration (picture 1 shows single slats with serious spalling). Lengthways cracks on the side and underside and continuous crossways cracks are especially dangerous, because they open up wider when under load. They are the forerunners of a break and these slats should be replaced immediately.



Picture 1: Single slats with spalling

Single slats are vulnerable to crossways cracking because they can be subjected to excessive sideways forces by animals mounting each other or when animals press forward at feeding areas where slats have been laid parallel to the feeding barrier. This type of damage is easy to see because the gap to adjacent slats will be narrower at one side and wider at the other.

Don't be tempted to leave single slats covering external agitation access points. Use a proper safety manhole slab designed for this purpose.

### Gang slats

Gang slats are also being replaced. Generally, gang slats would be expected to perform well for at least 15 years without having to worry too much about checking them. However, there is always the possibility that one gang slat may be suspect for some unknown reason, so an odd check for sagging or a crack, even with relatively new slats, is a reasonable precaution. It is not practical to lift gang slats for checking so use an inspection camera.

### Safety manhole covers (agitation points)

Galvanised manhole covers also need to be inspected and replaced as necessary. The hinges on both the main cover and safety grid should be examined carefully to ensure that they are not worn or loose. The hinges help to keep the cover and safety grid in the correct place and if they are worn the covers may move and fall into the tank.



Picture 2: Safety manhole cover -closed

In every case the grid under the main cover should be present – this is there for your safety, not as a nuisance. This is there to help when opening the main cover and allows a segment of the main cover to be open while having the vacuum pipe in the tank for emptying. Picture 2 shows a closed safety manhole cover and picture 3 shows partially open cover exposing the safety grid.



## Slat Inspection – an essential safety procedure

Both the frame set around the edge of the opening and the steel cover itself should be inspected for signs of any corrosion or pitting into the steel. The presence of any holes or pitting are signs of the manhole cover weakening and it will potentially fail if put under any pressure.

### How to enter a slurry tank safely.

Entering a slurry tank is a very dangerous job and should never be undertaken without a breathing apparatus or an external fresh air supply. Training is required in the use of this equipment. Alternatively, use an inspection camera that is waterproof and fitted with a light – this allows inspection of the slats without having to empty or enter the tank.

Never enter a slurry tank when you are alone, even with breathing apparatus. Always ensure that there are at least two people to assist you in case something goes wrong.

In addition to breathing apparatus, the person entering the tank should be connected by harness and lifeline to the two people outside the tank. This will enable the people outside the tank to pull the person in the tank to safety, if something goes wrong, without having to enter the tank.

The slurry tank should always be as empty as possible prior to anyone entering the tank.

### External Agitation

Under no circumstances should there be any internal agitation points and it is best practice that external agitation points are not within an animal area (Picture 4 shows an external agitation point). Safety manhole covers within an animal area will have a significantly shorter working



Picture 4: External agitation point

life than manhole covers that are not subjected to regular covering with slurry.

Where internal agitation points are present, all necessary work to move them outdoors should be undertaken. One of the excuses for having internal agitation points was that the slurry could not be agitated, however, in recent years machinery has developed to an extent that this is no longer the case, modern tractors and slurry agitators can easily agitate any slurry tank constructed in accordance with the Department of Agriculture, Food and the Marine's

specifications. The Department of Agriculture, Food and the Marine has specifications for the extension of concrete tanks to enable the provision of external agitation points in cases where the tank does not currently extend beyond the end of the shed. Under no circumstances should external agitation points be roofed over to extend an animal house. There are alternatives to internal agitation points.



Picture 3: Partially open manhole



### Replacing slats

If available, ensure the measurements of the new slats correspond with the old ones. Clean off the seating and surrounding concrete. Ensure there is sufficient bearing. Correct any unevenness between the new slats and the surrounding concrete with a stiff mortar bonded with an SBR (concrete glue) or similar. Your slat supplier will be able to recommend/supply a suitable product. Curing the thin bonded layer by covering it with polythene for at least 3 days is essential. This stops it drying out too fast.

If plastic type shims are used under the slats to level them, then the gap between the underside of the slat and the top of the wall should be pointed to provide continuous support under the slat where it rests on the wall. Otherwise, the slats could be vulnerable to cracking across the cross ribs from imposed loads.

### Slat standards

There are a wide range of different slat types out there, some manufactured to different standards, with varying lengths and depths. Slats bought from manufacturers on the Department of Agriculture, Food and the Marine's list of accepted slats indicates that they were tested and found to be in accordance with the slat standard in use at the time. The slat standard that the majority of slats purchased in the last few years have been produced to is EN 12737. In addition all slats are now CE marked to this standard and all companies undergo an annual audit by an independent body.

### Key points

- Check old slats for evidence of sagging.
- Failure can occur without warning, so when in doubt replace slats where problems are indicated or suspected.
- Never drive over slats with tractors or machinery unless they have been designed for the purpose. Indeed, one could argue that heavy duty slats should always be used instead of ordinary cattle slats.
- Slats with marked signs of deflection, cracking, spalling or rust staining should be replaced.
- Properly placed slats should be level, evenly spaced and free from rocking movement. Any damage, such as chipping and blisters caused during the laying process should be made good by the supplier.
- Only use slats supplied by manufacturers who are on the Department of Agriculture, Food and the Marine's up to date list of accepted slats.

There is no excuse for slatted tanks not to have correctly fitted and maintained external manhole covers and slats. Replacing a worn safety manhole cover and slat costs less than €1,000.

Additional information on the replacement of slats and design of new tanks is available in the Department of Agriculture, Food and the Marine Specifications, available at:

<http://www.agriculture.gov.ie/farmerschemespayments/tams/>

The relevant specifications are:

S.123: Minimum Specification for Bovine Livestock Units and Reinforced Tanks.

S.123S: Minimum Specification for the Replacement of Slats