General Construction Notes for the Patented ARK Agriculture Silage Clamp System

Not for general distribution

ARK Clamps in use, Suffolk, 2017

ARK agriculture are a supply only company of the patented sloping walled silage clamp system.

Before you work on the construction of the ARK Silage clamp we request you make contact with the team at ARK so we can talk you through the process to ensure the quick and safe construction of ARK clamps.

Please call us on

01206585090

Standard construction industry health and safety measures need to be incoroporated when installing these units

Contents

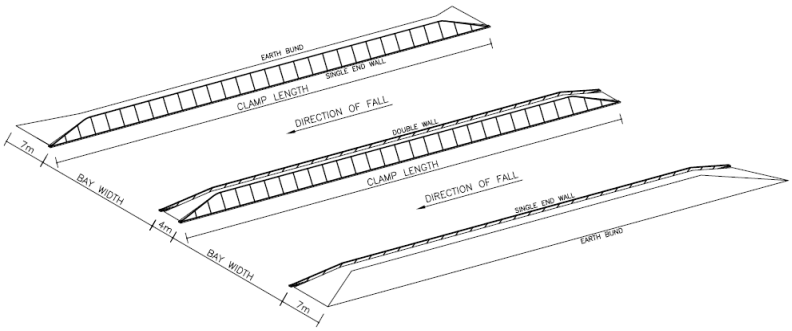
Typical clamp design

ARK Agriculture offer two simple silage clamp designs: -Parallel walls with an opening at both ends (‘Open ended’ or ‘Drive through’ clamps’) being the most common design, or three walls with an opening at one end (‘U shaped clamps’).

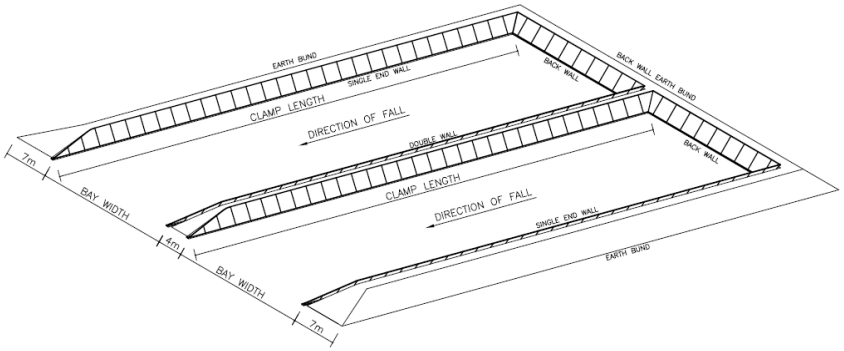
ARK strongly recommends the open ended layout as this offers more flexibility, ease of operation and better silage quality. ‘U shaped’ clamps should only be considered where site limitations make it impossible to position an open ended clamp.

ARK will advise on the best design for your requirements.

For further design advice please contact ARK **sales@ARKagriculture.com**



Open ended (Drive through) Clamp



U-shaped Clamp

Environmental Considerations

These Construction Notes have been produced by ARK Agriculture following consultation with the Environment Agency to ensure that silos constructed in this manner should comply with the SSAFO Regulations 2010.

SSAFO Regulations

The proposed development will have to meet the requirements of The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) Regulations 2010. These are commonly referred to as **SSAFO.**

These SSAFO regulations govern all methods of making and storing of silage crops and set out minimum standards of design and construction, which must be met whenever a relevant system is used.

Requirements for silos:-

- The system must be impermeable, resistant to corrosion and constructed to meet BS 5502: Part 22 1993. It must have a life expectancy of at least 20 years (with maintenance).
- No part of the system can be within 10 metres of inland freshwaters or coastal waters that silage Leachate could enter.
- The base must have drainage collection channels around the outside. Where there are walls, the base of the silo must extend beyond them and be designed to collect any Leachate at the perimeter.
- The walls must also be able to withstand any likely load placed upon them in accordance with BS 5502 Part 22 1993;
- Collected Leachate should be conveyed to a purpose-built Leachate tank that should have a life expectancy of 20 years without maintenance;
- All parts of the system must comply with the regulations whenever it is used. Proper maintenance is therefore essential.

A copy of the regulations can be viewed at:
http://archive.defra.gov.uk/environment/quality/water/waterquality/diffuse/nitrate/documents/201009ssafo-england.pdf or Google 'SSAFO 2010 Environment Agency'

Environment Agency

The revised SSAFO regulations came into effect on 15th June 2013.

> *"(1) this regulation applies to any silo, slurry or fuel oil storage system whose construction is to be begun on or after 15th June 2013 ("a new or improved store").*
> *(2) A* ***person who proposes to have custody or control of silage, slurry or fuel oil that is to be kept in a new or improved store must give the Agency notice specifying the type of silo or storage system and its location, at least 14 days before work constructing the new or improved store is to begin.***
> *(3) In this regulation, "construction" includes substantial enlargement and reconstruction."*

The SSAFO regulations do not place requirements on the EA to undertake specific actions when notifications are received, or require them to inspect premises.

Upon receipt of the proposals the EA will assess the proposals and may visit the site they may also ask you to fill in notification form WQE3.

The EA can serve a Notice where there is a significant risk of pollution to controlled waters. They will assess compliance using all appropriate evidence - mainly a visual inspection.

The Notice will outline steps to be taken, or for improvements to be made to an existing or to a new installation in order to reduce to a minimum any significant risk of pollution of controlled waters.

Normally they will have dialogue with a farmer / operator before serving a Notice.

If pollution occurs the farmer / operator may be liable, even if the EA has agreed to the system installed.

Leachate

Leachate, (fermentation juice or silage liquor) may occur when preparing, storing or extracting silage. Leachate normally develops during the fermentation process, with dry matter content less than 30%.

The majority of leachate will be produced in the first three weeks after the clamp has been filled.

Maize silage leachate is highly acidic, pH 4 and has a Biochemical Oxygen Demand BOD of 12,600-90,000mg/litre.

The Leachate must be collected, drained off into an impermeable container and disposed of in a safe manner.

Collection tanks must be incorporated within the silo system. The drainage system components should be connected with corrosion resistant pipes, of sufficient diameter, located beneath the frost level.

The tanks must be monitored and emptied regularly during the drainage period in the first 4 – 6 weeks.

Leachate collection tanks buried in the ground must be constructed to meet BS 5502: Part 22 1993, be impermeable and resistant to attack by the highly acidic silage Leachate and must have a life expectancy of at least for 20 years without maintenance. (CIRIA Report 126 provides guidance on tank construction.)

The tank size depends upon the Silo System Capacity as indicated in the table below (information taken from the SSAFO regulations).

Silo Capacity	Less than 1,500 m^3	Greater than 1,500 m^3
Leachate Tank Capacity	20 Litres per m^3 Capacity	$30m^3$ + 6.7 Litres for every m^3 Capacity over $1,500m^3$

If material with a low dry substance content is ensilaged (e.g. silage maize for biogas,) accumulation of larger amounts of Leachate must be allowed for and **daily control of leakage of Leachate during ensilaging is essential.**

Outlet or overflows from the Leachate tanks must be within the silo system. The tanks must be emptied regularly such that they are never more than ⅔ full.

If regular emptying of the Leachate collection tank cannot be guaranteed, the tank's capacity must be increased as required.

Where a Leachate tank is constructed in situ, below ground or partially below ground, the designer/installer will need to complete the relevant part of EA Form WQE3.

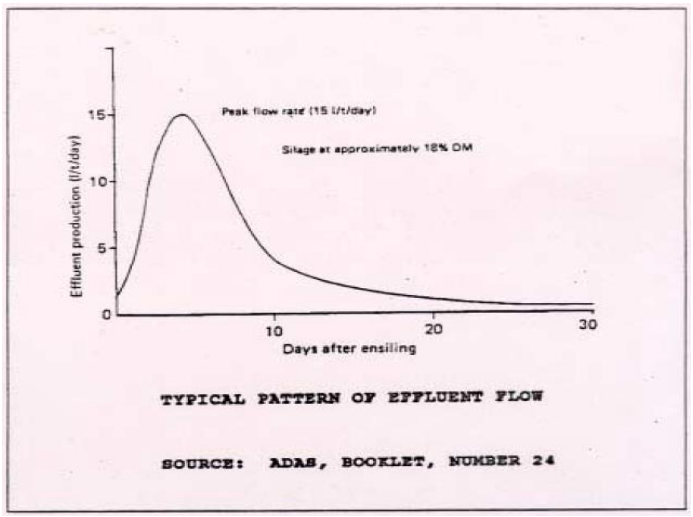
Uncontaminated surface water should be drained off outside the silo system to soakaways.

Leachate Tank Testing
Before the Leachate tank is backfilled and buried, it must be tested for water tightness.

Drainage

During the fermentation process, at least 50% of the silage leachate is generated within the first week and in the next two weeks an additional 25% is produced; thus 75% of the silage leachate can be generated within three weeks after ensiling.

Silage leachate can continue to be generated for a period up to eight weeks after ensiling. The graph below shows the pattern of silage leachate generation over time.



Typical leachate production

It is therefore important to cover the clamps effectively because in cases where rainfall, groundwater or storm water is not excluded, Silage leachate generation can continue for the entire biological life of the silage pile.

The Leachate must be drained off quickly to prevent acidic attack at the joint between the silo wall and floor, so in addition to a 2% fall along the axis of the silo, it is recommended that a longitudinal "gulley" is created by sloping the silo floor with a 2% fall away from the side walls. Note that there should be no joints in this gulley.

A drainage system is needed for each silo bay which should where possible enable the Leachate and surface water to be drained off separately. This system should be designed by a drainage consultant taking into account the nature of each silage clamp site.

Silage residues should be prevented from accumulating on the floor by regular cleaning.

The farmer / operator is responsible for the design and operation of the silage system and they should ensure that pollution of surface or ground waters is prevented.

Durability of Materials

Insitu Concrete

Silage Leachate is acidic and attacks all types of concrete, leading to degradation over time.
For selection of appropriate concrete mixes for extreme exposure conditions refer to BS8007: 1987, BS 8500-1:2006 and BS8110-1:1997

Laying the concrete

Insitu concrete must be ordered to the correct specification and laid with due care. The concrete

requires compacting depending on its consistency - compaction may be manual or through mechanical vibration.

Concrete Curing

Correct curing ensures that the concrete will achieve maximum strength; have good wear resistance, be durable in terms of resistance to weathering and resistance to chemical corrosion, reduces shrinkage cracking and ensures good adhesion for subsequent silo coatings.

Curing involves retention of moisture in the concrete and the maintenance of a favourable temperature to prolong the hydration process. The curing regime should prevent the development of high temperature gradients within the concrete.

Commonly used curing methods include covering the concrete with cover sheets which should be in place for at least 7 days or the application of suitable liquid curing membranes.

Surface Treatments

Surface treatments, either as surface coatings or penetrating sealants, should be applied to concrete exposed to strong chemical corrosion (pH < 5.5). ARK Agriculture has products for just this purpose; please contact us for more information.

Coating thickness and wear

The durability and resistance of surface coatings is largely determined by the strength and quality of the subsurface which is dependent upon proper curing of the concrete.

A sufficient coating thickness (2 or 3 coats) must be achieved; if the coating layers are too thin, acid penetration may occur, which usually causes even greater damage to the concrete surfaces than if they had been left untreated. The coating manufacturer's instructions should be followed.

Please contact ARK Agriculture for more information on the products we are able to supply to coat panels.

Precast Concrete Panels

The concrete used in the Wall Panels is designated C40/50, complying with BS8500 exposure classifications XC4, XF4 and XA3; using 20mm flint aggregate.

Exposure Class	Class Description	Nominal cover to reinforcement $35+\Delta c_{dev}$	Min Compressive Strength Class	Min Water/Cement ratio	Minimum Cement content kg/m^3
XC4	Moderate humidity or cyclical wet and dry	40mm	C25/30	0.65	320
XF4	High water saturation	40mm	C40/50	0.45	360
XA3	Chemical attack: Acid water PH≤ 4.0		C35/45	0.45	360

Surface treatments, either as surface coatings or penetrating sealants, should be applied to the wall units after 1 year to give protection against silage Leachate attack.

ARK Agriculture are adamant that protective membranes (side wall sheets) must be used.

Hot Rolled Asphalt (HRA)

Floors of bunker silos are constantly exposed to aggressive silage Leachate and mechanical stress due to the use of machinery such as silage cutters, mixing vehicles etc.

Asphalt is well suited for the construction of silo floors **provided that Limestone materials are excluded**.

Asphalt is acid-proof, sufficiently resistant to abrasion and withstands mechanical stress. Because of the bitumen's chemical stability against many acids and Leachates (even in high concentrations,) asphalt achieves a very long useful life provided that the aggregates are added with due care and to the correct formulation.

The higher the density of the asphalt laid, the greater its resistance to aggressive fluids; proven construction methods include tightly roller-compacted asphalt or mastic.

Bitumen has not been found to contain any harmful or soluble substances that can be expected to have negative effects on food or forage.

Asphalt is also used for hygienically demanding circumstances, such as for making drinking water pools, water reservoirs, pipelines etc. watertight.

A floor constructed with HRA surfacing will comprise a series of layers formed over the sub-grade (natural ground). The thickness and type of these layers depends upon the stability of the subgrade. If site conditions are satisfactory and traffic is limited (self-feed systems) then the construction could comprise a sub-base (compacted crushed stone), a binder course of HRA and a top surface course of HRA. Where vehicles regularly use the floor, a base of dense regular concrete mix may also be required. Specialist advice should be obtained for the design of the floor.

The life of the laid asphalt can be enhanced by ensuring:

- That the area is not used for storage or parking of vehicles, machinery etc. when the clamps are empty.
- Oil, mud and waste silage is removed from the surface as soon as possible.
- Any damage to the surface is repaired using a suitable impermeable bitumen product.
- All joints between the floor and wall panels and drains are inspected regularly for signs of wear.

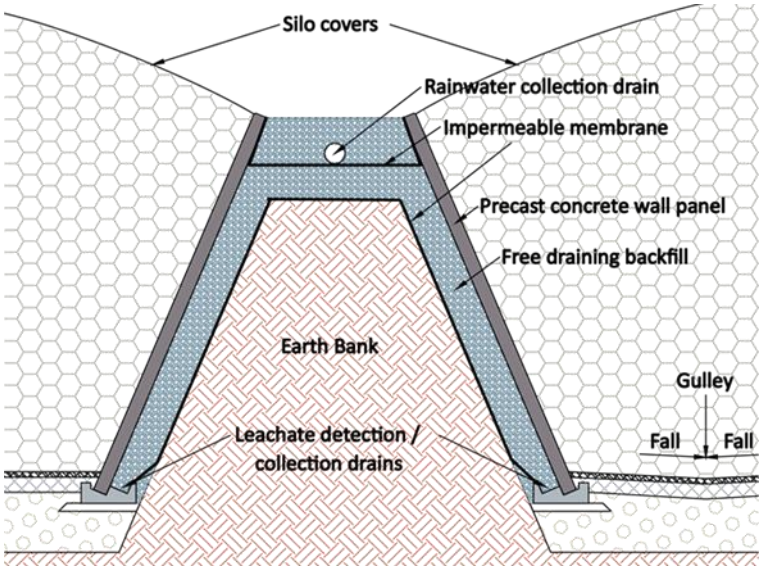
References:

CIRIA C759 : 2015	"Livestock manure and silage storage infrastructure for agriculture- *Part 2 Design and construction*
BS5502-2: 1990	"Buildings and structures for agriculture - Code of practice for selection and use of construction materials"
BS8077: 1987	"Design of concrete structures for retaining aqueous liquids"
BS8110-1: 1997	"Structural use of Concrete- code of practice for design and construction"
BS8500-1: 2006	"Concrete – Method of specifying and guidance for the specifier"
ADAS CGN 012: 2002	"The use of hot rolled asphalt (HRA) surfacing for agricultural forage silos"
BS EN 13108-4: 2016	"Bituminous mixtures - Material Specifications - Part 4: Hot Rolled Asphalt"

Silo Construction:

For health and safety reasons it is recommended to construct the Silo in the following sequence:

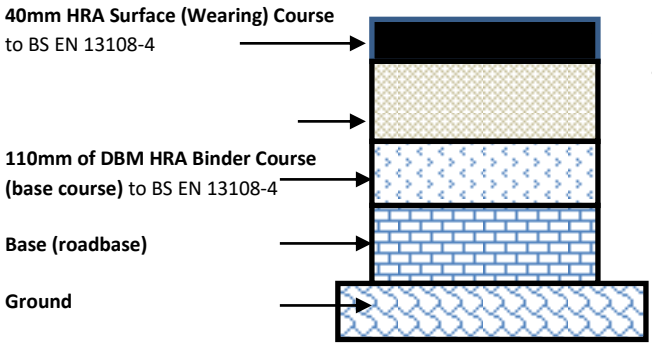
1. Frost Protection Layer (clamp base)
2. Earth Bank Construction
3. Laying the seating channel
4. Drainage installed
5. Placing the wall panels and fitting tension anchors (supplied)
6. Back-filling the wall panels
7. Laying the silo floor area with asphalt



Section through internal bank

1. Frost protection layer

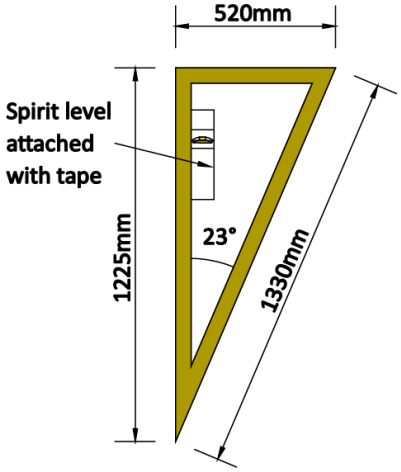
Frost sensitive soils such as clay or silt can heave when subjected to long periods of sub-zero temperatures.



Therefore it may be necessary to replace the frost susceptible soil with a frost-proof base, (e.g. finely graded gravel, sands or other frost-proof soil material,) which can be easily compacted to provide a strong foundation layer.

In the case of non-load bearing soil, soil-improvement work will have to be carried out.

2. Earth bank construction



A profile frame can be made up as above to achieve the correct bank slope

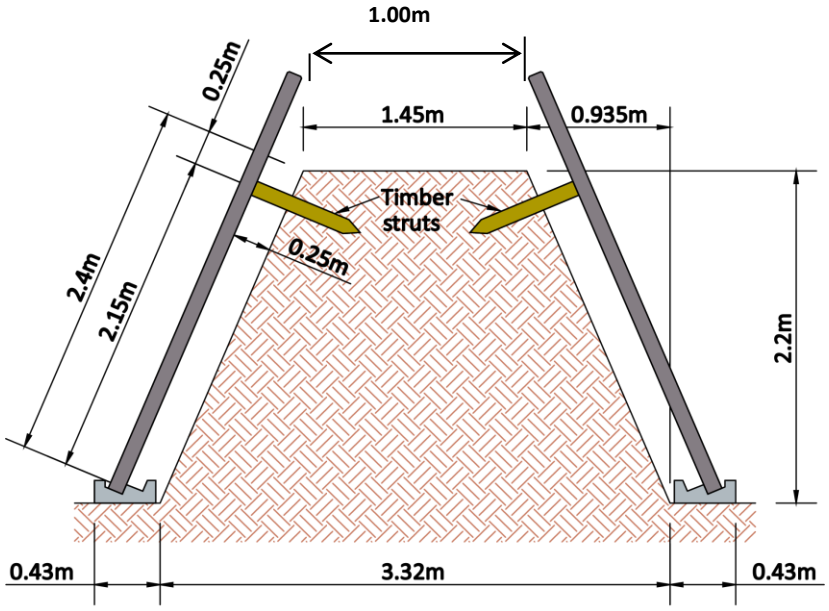
It is recommended to first construct a generously dimensioned preliminary earth bank and to then cut it off to match the 23° incline of the wall panel using a digger.

The earth bank should be at least 1.45m wide at the top, (1.00m between the tops of the precast wall units) – Heavier silage compactors will require wider banks – consult your structural engineer.

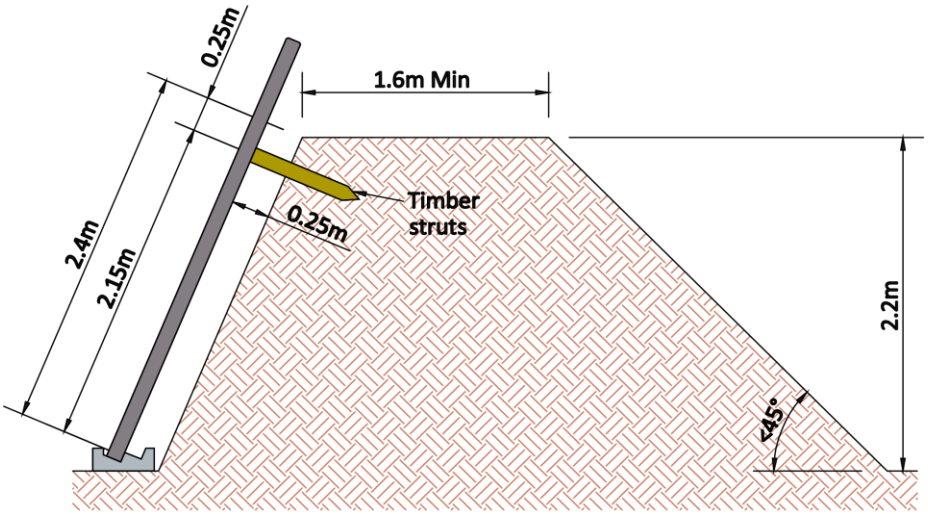
The bank should be built up in compacted layers – the depth of the layers will depend on the soil, type of machinery being used and local conditions.

Allowance must be made for the 200 – 300mm thickness of backfill between the bank and the precast wall units.

Earth banks being built up or 'dug in' prior to panel installation



TYP. SECTION THROUGH DOUBLE WALL EARTH BUND



TYP. SECTION THROUGH SINGLE WALL EARTH BUND

The outer slope of external bank should be less than 45˚ for safety reasons; this bank should be planted to prevent soil erosion.

A geotextile liner (e.g. Terram T1000) should be placed over the bank, to ensure that the gravel infill does not migrate into the bank.

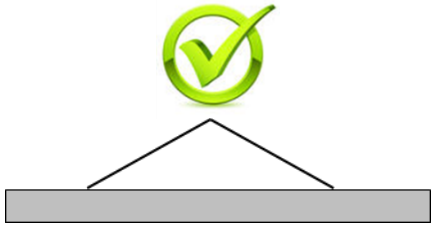
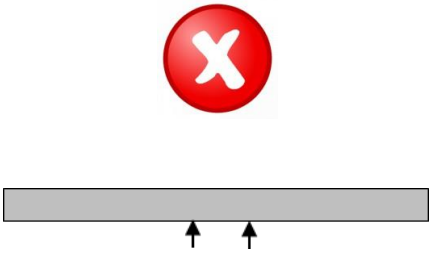
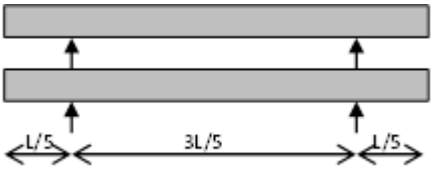
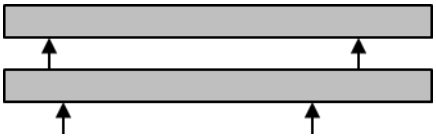
3. Seating channels

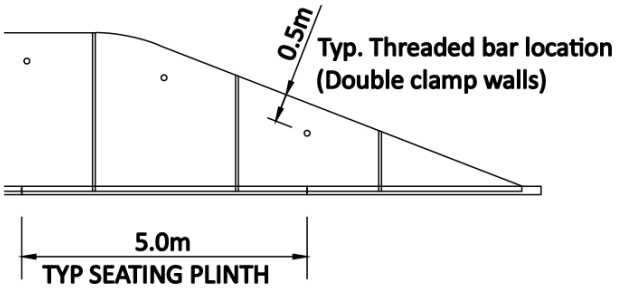
3.1 Offloading and stacking

2.5m or 5m long Seating channels weigh .5T / 0.25 T. The seating channels are to be lifted with chains using 2No. M12 lifting loops (supplied) inserted into sockets cast into the top of the units.

Extreme care should be taken when moving and stacking the seating channels to avoid damage. Stacking should be on firm level ground.

Lifting of channels should only be carried out with the appropriate machinery – Telehandlers (due to their swaying motion on rough ground) are not advised.

Lifting	 A set of M12 wire lifting loops (SWL 500kg) will be supplied with the first delivery of seating channels. These loops screw into the open sockets on the seating channels for easy handling with lifting chains.	 Seating channels should not be lifted in the middle with forks.
Stacking	 Stacking should be on level ground with bearers placed at $^{1}/_{5}$th points	 Bearers should line up vertically above one another



3.2 Installation- General

The seating channel has 2 recesses, the upper (front) recess supports the wall panels, and the lower (back) recess acts as a drain should leachate penetrate the wall. The seating channels are set below the surface of the silo floor so that the flooring material covers the top of the channel.

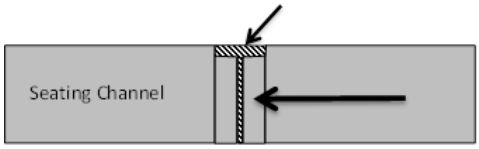
The seating channel must be positioned at a constant offset from the base of the bank to allow placement of the gravel backfill.

The seating channels are placed on concrete blinding and anchored against sideways displacement by 2No. H25 bars 600mm long embedded in the lean-mix concrete blinding; (these bars will be supplied with the first plinth delivery.)

The technical drawings that are supplied with the clamps will explain the positioning of the seating channels on site. The channel with the down pipe built in must sit at the lowest point on the clamps.

You can choose to apply a bead of the bitumen paste in the recessed sections of the channels once installed.

Bitumen bead sealing joint between seating channels

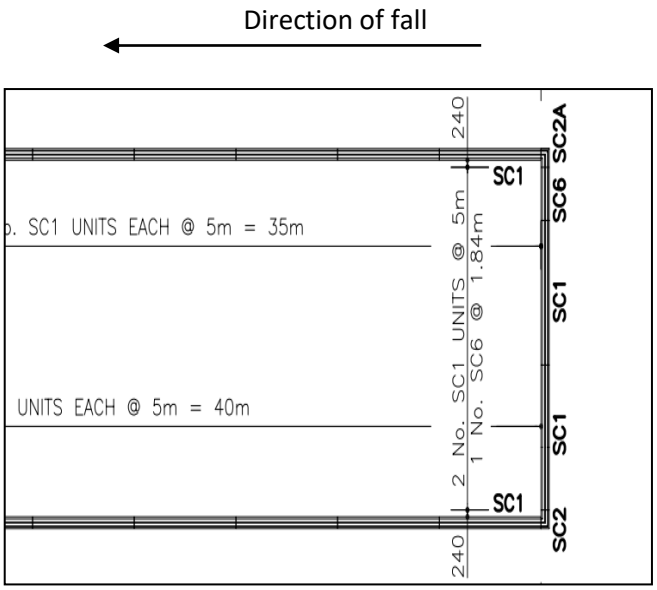


Typical install of seating channels

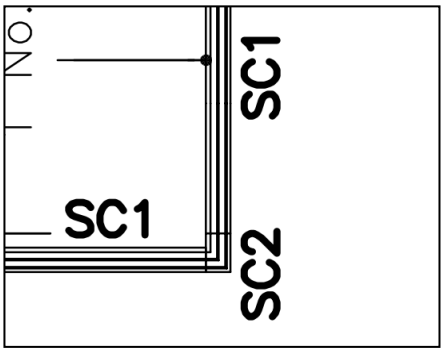
3.3 Installation - U shaped clamps

When constructing a 'U shaped clamp', separate corner pieces (marked on the drawings) will be supplied.

The seating channels should be laid, working away from the top left corner, please see example below.



Corner detail – please note the drain behind the panels must remain uninterrupted



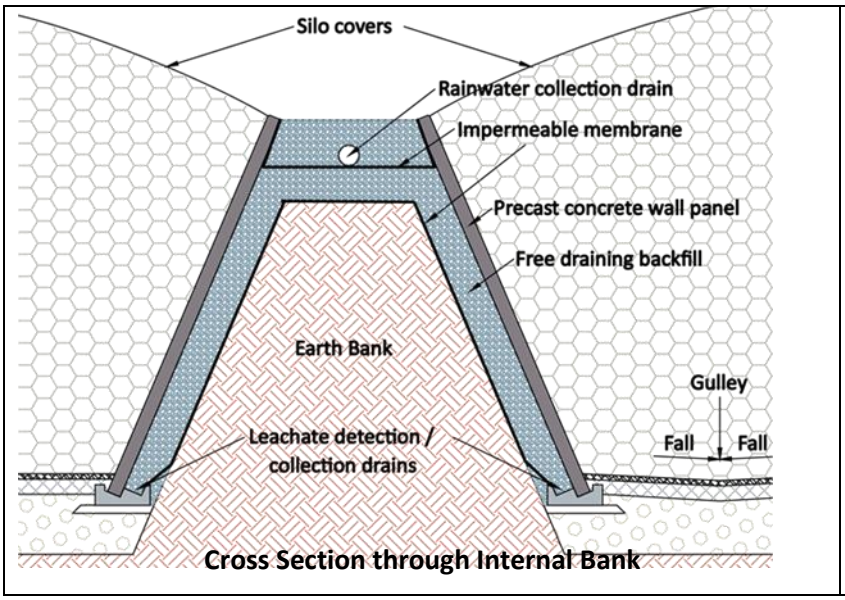
4. Drainage

All drainage arrangements are site specific and must adhere to the SSAFO regulations- professional advice from a drainage engineer should be obtained before work commences.

ARK UK does not accept any responsibility for the specific drainage design of the silage clamp, however it is good practice to slope the floor away from the base of the walls and to have a 2% longitudinal fall along the axis of the silo.

In the unlikely event of leakage occurring through the vertical joints in the concrete panels, the leachate will percolate down the back of the walls and be intercepted by the Leachate leakage collection drains incorporated in the seating channels. These channels should be connected to an inspection chamber prior to entering the main leachate drainage system.

When the highly nutritious silage effluent is used to feed Micro-organisms present in AD plants and suitable control mechanisms must be incorporated by the drainage designer.



Laying impermeable membrane

Surface water collection drains can be located on top of the earth bank, separated from the free draining backfill by an impermeable membrane to convey rainwater run off from the silo covers to the surface water drains.

Although there is little likelihood of Leachate leakage through the wall panel joints, the concrete seating channel incorporates a collection drain, thus complying with the SSAFO regulations which require Leachate drains behind the walls. These channels are connected to collection drains which pass through an inspection chamber that is regularly inspected for signs of Leachate contamination.

Seating Channel with Drain outlet

All drainage pipes should be of sufficient diameter to cater for the volumes generated. These pipes must be surrounded by a jacket of filter gravel which must be separated from the surrounding soil by a geotextile.

The percolation performance of the soakaways should be verified by percolation tests.

Note:

The farmer / operator is responsible for the design and operation of the Silage system and they should ensure that pollution of surface or ground waters is prevented.

If pollution occurs the farmer / operator may be prosecuted by the Environment Agency.

5. Erection of Precast Walls

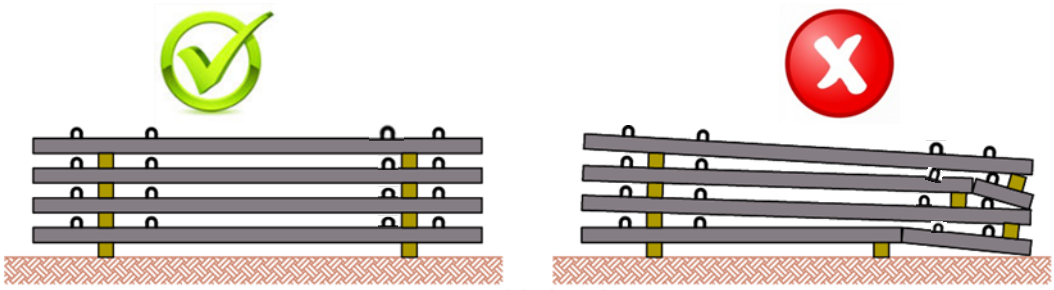
Offloading wall panels from Lorries – not the panels are reversible for use both ways.

For off-loading wall panels, attach chains to 3 outer loops

The client is to provide appropriately trained labour and machinery to offload the precast units. Suitable control measures should be provided to protect operatives from falls from height.

3m x 2.5m x 0.1m Wall panels weigh ~ 1.8T. For offloading the wall panels, lifting chains should be attached to the 3 or 4 outer loops as illustrated on opposite page.

The length of chains or slings should be sufficient so that the included angle is not greater than 90°
Stacking wall panels



Firm reasonably level ground

If the wall panels are to be placed in stacks, they should be placed on timber bearers, located just in from the sides of the panel, with the bearers lined up vertically above one another. Similar sized panels should be stacked together.

Care should be taken in the stacking and general handling of the units, taking into account the weight of the products and the load carrying capacity of the ground.

5.1 Timber struts.

Suitable wooden posts (e.g. 75mm x 75mm x 1.2m long,) provided by the client, are driven into the bank, one post per wall panel. (These timbers will remain in position after the panels have been backfilled.)

The purpose of the posts is to act as temporary support to the wall panels, ensuring that they are correctly aligned at 23° to the vertical and positioned off the bank, before the backfill is placed.

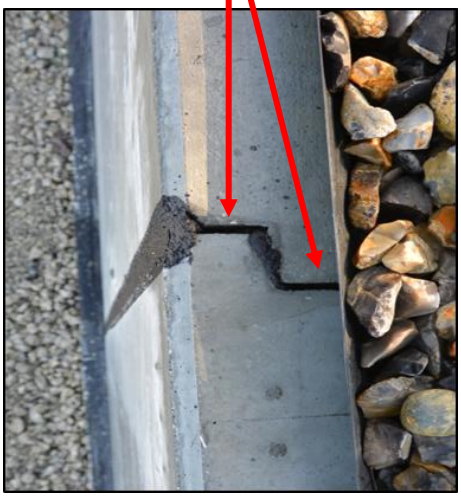
Using the profiling gauge, the posts are marked and cut to the correct length to support the wall panels.

5.2 Vertical joints

The joints between the wall panels should not be exposed to leachate if the appropriate side wall film is used - if not they will only be subjected to short term exposure to dilute Leachate when the silage is wet. The “halving joints” on each vertical edge need to be treated with the specialist primer (Hahne – Imberal Aquarol 10D) and then the 2 component bitumen sealant (Hahne – Imberal Aquarol 90B) (approx. 0.7 litres / metre run) in accordance with the manufacturer’s instructions on the tub and within the order confirmation pack.

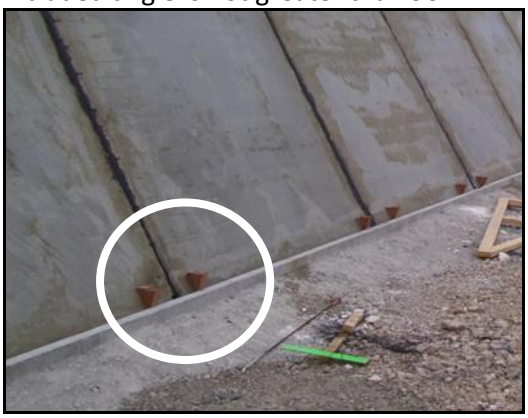
Correct application: Applying plenty of bitumen over entire face ensures the joint is filled

Incorrect application: Insufficient bitumen (note the unsealed gaps between panels)



Placing wall Panels

The 1.8T wall panels are lifted from the stack using the two outer loops cast into the back of the unit. The length of chains or slings should be sufficient so that the included angle is not greater than 90°



The wall panels are lowered into the upper groove in the seating channel and leant against the wooden strut.

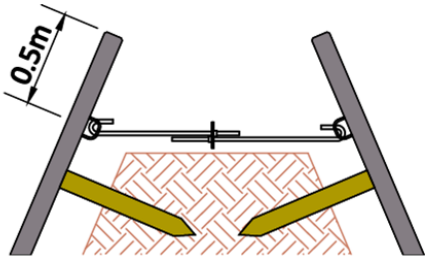
It is suggested that pieces of wood are used as wedges to keep the bottom of the panel tight against the back of the precast seating channel.

An 800mm long tube (supplied) is placed through the top loops at the sides of the wall unit and secured with an oak wedge (supplied) to ensure that there is a tight joint between the units.

ARK UK will provide you with drawings outlining the correct layout of the wall panels and channels for the clamp design.

5.3 Fixing of ties

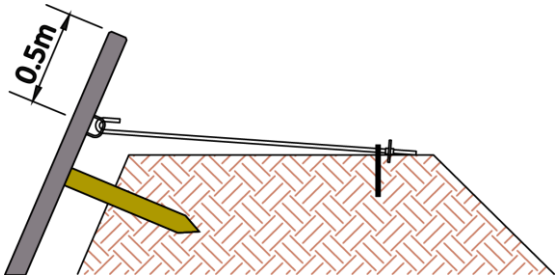
The tension ties are designed to restrain the wall panels from being displaced when the gravel backfill is placed.



2 No. 16mm threaded ties pass through plate and secured with nuts

For **internal banks**, the wall panels are tied to one another by hooking the ends of the 1.2m threaded tie bars through the centre loop cast in the back of the wall panel, (500mm from the top,) and fixing them together with a drilled plate and nuts. (Tension ties can be omitted for joining lower sloping panels PC3,PC4, PC6 and PC7.)

For **external wall panels**, the hooked end of the 1.20m long tie bar is inserted through the centre loop cast into the back of the panel and the anchor plate is fixed to the other end and laid on the top of the bank. A U bar, placed tight against the anchor plate is driven vertically into the bank to restrain the assembly.



1 No. hooked threaded bar, 1 No. plate, 2 No. nuts and washers; plate restrained by 1No. U bar driven vertically into bank

5.4 Treatment of horizontal joints

The gap between the top of the plinth and the precast walls is filled with non-shrink grout (supplied) and the wooden wedges removed. This joint will be covered by the asphalt support layer.

5.5 Backfilling the wall units

Free draining backfilling material (8–32mm) should be **carefully trickled** into the 250 – 300mm gap behind the precast walls in 150mm layers.

Recycled concrete as produced at state-of-the-art reprocessing plants is also suitable; to assess the material the constructor must consult a specialist (e.g. a civil engineer or a road

construction specialist).

The drainage material should not be mechanically compacted or washed in.

6. Silo Floor

Hot Rolled Asphalt (HRA) specified for use on silage clamps should be laid in two layers with the void content limited to a maximum of 3.0% vol. Careful compacting is therefore required, especially towards the margins.

The mineral products used (e.g. grit, sand and filler) must be resistant to acids, e.g. basalt, granite etc. **- Limestone fillers must not be used.**

The recommendations made in this document only apply to the use of roller-compacted asphalt.

Large areas of asphalt are laid by machine, smaller areas by hand. It is particularly important to avoid unevenness which leads to puddle formation, and ensure careful compaction to avoid subsequent Leachate infiltration through the asphalt layer. It is normal practice to offset joints in different layers.

Careful planning of this operation is essential as the asphalt should be laid in a continuous operation. (Cold asphalt is difficult to compact and does not produce a smooth surface.)

The gap between the top of the silo floor and the precast walls is to be filled with an acid resistant, permanently elastic bitumen material or epoxy sealant.

Newly laid HRA should not be trafficked until it has cooled to ambient temperatures - normally about 24 hours. Certain machinery oils soften HRA and sustained point loadings can damage the surface. HRA surfaces should not be used as permanent parking or for pallet/feed trough storage areas.

7. Silo Wall Leachate protection:

Leachate is acidic and attacks all types of concrete, leading to degradation over time.

Surface treatments, either as surface coatings or penetrating sealants, should be applied to the wall units after 1 year to give protection against Leachate attack.

Protective membranes such as ARK polyethylene Side Wall Film should be used to ensure that air is kept out of the silage and to protect the concrete walls.

Silo Inspection and Maintenance:

Element	Symptom	Cause	Remedy
Walls	Cracked or spalled concrete	Machinery impact damage causing corrosion of reinforcement due to insufficient concrete cover	Remove damaged concrete and make good with R+M products (contact ARK)
	Erosion of concrete	Leachate dissolving cement matrix	Repair damaged area with R+M products (contact ARK). ARK Protective Silo Paint can be applied to the bottom of the wall panels. Protective membranes such as ARK polyethylene Silo Wall Film must be used.

Wall Joints	Leachate detected in inspection chamber. Sealant between concrete wall panels damaged or degraded	Inappropriate sealant or simply worn out	Remove old jointing material. Clean out joint and reseal vertical joints between the precast wall panels with ARK Bitumen filler.
Floor	Floor eroded	Leachate dissolving cement matrix	If only slight erosion, slow down further deterioration by coating with penetrating sealer. If severe erosion, resurface
Floor Joints	Leachate detected in inspection chamber. Sealant between Floor / Wall panels damaged or degraded	Inappropriate sealant, or simply worn out	Remove old jointing material. Reform groove. Reseal with permanently elastic, acid-proof bitumen grouting compound.

Wall panels
Before the silo is filled the wall panels, joints and asphalt should be inspected for damage and repairs carried out as necessary.

Wall panels should be thoroughly cleaned to remove old silage residue. Repairs can be made with the appropriate R+M materials (contact ARK for more information).

ARK Silo wall paints can be sprayed onto the concrete and ARK Protective Silo Paint can be applied to the bottom of the wall panels.

Vertical joints between the precast wall panels should be repaired with ARK Bitumen filler.

The horizontal joint between the wall panel and silo base should also be inspected and repaired as necessary with permanently elastic, acid-proof bitumen grouting compound.

Silo Floor
Silage residues should be prevented from accumulating on the floor by regular cleaning.

Repair: Where small areas of the surface are damaged repair products are available; these should be checked for their permeability characteristics. They must be used strictly in accordance with the manufacturer's instructions and be inert after curing. For major repairs consult an experienced contractor.

Resurfacing: A detailed survey of the existing floor slab should be carried out to confirm that

a new surface could be laid without causing any structural damage.

Once the base is approved as structurally sound the old floor should be prepared in the following manner:

a. Power wash apron to create a clean surface.
b. Thoroughly clean all existing cracks or open joints and fill with a sealant.
c. Repair potholes and failed edges.
d. Form chases in floor at the front of clamp to key the new surface.
e. Apply tack coat.
f. Lay and compact HRA surface course and caulk joints with sealants or water bars.

Drains
The Leachate inspection chamber should be inspected regularly to ensure that there is no leakage through the concrete walls / joints. If Leachate leakage is detected the wall panels and joints will need to be inspected and repaired.

Leachate Tank
Tanks must be monitored and emptied regularly during the drainage period in the first 4 – 6 weeks.

The tanks must be emptied regularly such that they are never more than ⅔ full.

Disclaimer

ARK Agriculture Limited assumes no liability for damages caused by incorrect construction of the silo. The work described must be performed by qualified specialist firm. - The selection of such specialist firms is at the sole discretion of the client.

ARK Agriculture Ltd
Lyndsey House
Brunel Way
Severalls Industrial Park
Colchester
CO49QX

Note: These construction specifications are not to be disclosed to third parties!