

Welcome to a 'reduced climb' **BIRD'S SILO** This is your investment in safe profitable grain storage!

Silo Features

This silo is fitted with equipment for ground level safe effective fumigation and top lid operation. For your safety a fall arrest cable has been installed. A hook ladder is provided with this silo that must be 'hooked up' out of the reach of children when not in use.

Please take time to read this manual, it contains vital information on silo operation, your health and safety, effective fumigation and insect control and your responsibilities.



Silo venting and fumigation system

This silo is fitted with a ground level phosphine application system for safer more effective fumigation. Phosphine tablets are placed on the mesh in the tray which also acts as seal plate and is then clipped up to the base grain control valve. (See page 7 & 8) As the gas evolves from the tablets it is carried either up or down the external (black) thermosiphon pipe. This works on the principle of warm air rising as the sun heats the pipe and cold air falls as the air in the pipe cools after dark. Tests conducted by the Department of Agriculture and Food and published at national and international conferences have shown this to be a very effective method of distributing phosphine gas throughout a grain bulk.



The pressure relief valve built into this system allows air to move in and out of the silo as internal pressures change. Air will bubble slowly through the oil as it passes in or out of the silo when the silo contains grain and the seal plate is in place. If the silo is empty leave the lower seal plate/fumigation tray off to prevent constant wall stress as the silo air expands and contacts and air bubbles violently through the oil in the valve. The valve is translucent to be able to see the oil levels which must be kept at the line indicated to ensure the pressure or vacuum is not exceeded. Open the level plug to be sure you do not overfill. If the oil level is increased by condensation that has run down the pipe, open the drain plug under the valve briefly to remove the water and re-tighten it to stop oil loss.

The visible oil levels allows you to quickly pressure test the silo annually or before fumigating with phosphine.

Ground operated top lid

This silo is fitted with an award winning **'Ezy On and Off'** silo lid. This reduces the frequency of climbing and can be closed very quickly if needed but it also allows the lid to be <u>sealed</u> from ground level before conducting a fumigation.

The lid is controlled by a winch and cable located on a support leg. The winch is fitted with a ratchet to enable the lid to be locked and sealed.

To open:

1. Check the oil level in the valve—if the oil is

lower on the outlet side of the valve the silo is in negative pressure and it will be very difficult to open the top lid. Unscrew either of the caps on the valve system to let air into the silo.

2. Flick back the ratchet latch and wind the handle, stop when you feel the cable get tight, the lid will remain in the open position.

To close:

Wind the winch in the opposite direction until you feel the cable tension, flick down the latch and wind the handle for another two clicks on the ratchet to seal the lid ready for fumigation.





Profit from Quality Grain Storage

This silo is designed to maximise your return from storing grain. The three main principles of storing quality grain are:

Keep it dry, Keep it cool, Keep it free of grain insects

- To ensure the quality is preserved load only grain below 12% moisture content and it should contain no more weed seeds than allowed by central storage operators (particularly radish).
- Harvest grain to be kept for seed late in the day when it has cooled on the stalk. Harvesting cool grain is not always possible in some parts of the WA grain areas but aeration can be easily fitted to this silo to hold grain below 20°C. At this temperature, quality and germination is better maintained and grain insects breed more slowly.
- Insects consume grain or grain particles and liberate some of the moisture contained in the grain. This moisture can move with air currents and accumulate in the top of the silo activating moulds and reducing quality (profit).
- Hygiene around the silos is the first line of defence to protect your grain investment. Pick up spilled grain and dispose off site. The insects that infest your grain exist in the farm environment, however even with excellent hygiene a few insects can fly into the open silo or auger hopper as it is being loaded.
- Don't risk your investment in the grain, fumigate after it is loaded into the silo, don't wait until you see the insects. (be sure the silo is sealed—see P6 for pressure test) By the time insects become visible they have reached a population density of 1000 to 2000 per tonne. If you load new grain on top of old the silo must be fumigated again. (see fumigation P 7)
- Check the grain monthly to be sure insects are not present in the grain. The most effective method to do this is with insect pitfall traps set in the surface of the grain. You will see insects in the traps long before you see signs of their activity in the silo or in a handful of grain . Pitfall traps can be as simple as a cut down drink container covered in fly mesh.
- Keep the seal plates in place after fumigation to prevent re-invasion by stored grain insects.
- For more comprehensive advice on quality stored grain contact the Department of Agriculture and Food or visit the crops / storage section of the DAFWA website. http://www.agric.wa.gov.au

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Pressure test

The annual pressure test is vital to be sure the silo will hold the phosphine gas in the silo at the right concentration for the right length of time.

Gas loss can lead to insect survival and developing resistance to phosphine. The time of day when the test is done will have a big influence on the result. If you do it as the silo is warming it will hold the pressure for longer and if you test in the afternoon as the day is cooling it will lose pressure more quickly. The internal silo pressure is very low so heat or cold on the wall of an empty silo will create instant expansion or contraction of the air contained inside.

Test the silo under full sun or full cloud around midday.

- Inspect the lower seal and the ruber seal 1. on the top lid. If they are damaged replace them. If they appear to be OK --
- 2. Close and lock the top lid with the cable winch.
- 3. Fit the seal plate/phosphine tray to the base of the silo.
- Check both screw caps on the black tube 4. are tight.
- 5. Direct connect an air hose to the tubeless tyre valve located on the silo wall.



(first remove the internal valve-close off using the valve cap only)

- 6. Pressurise the silo until the oil level in the pressure relief valve reaches the higher black line.
- Remove the air line or switch off the air. 7.
- Observe the time it takes for the oil level original level in not less than 8. to fall back halfway to the original level line. This should take three minutes or



1 Oil level at rest



2 Oil level with silo under pressure-25 mm difference



3 Oil level falls to half the three minutes

longer. If the pressure is not held for that time, re-pressurise the silo and spray soapy water on the lower seal or top lid and watch for air bubbles. This will indicate an air leak-replace the damaged seals and re- test.

Fumigation Procedure

Phosphine (Phostoxin) gas is the most valuable stored grain insect control in the world but it's use is also under threat from increasing resistance in grain insects. In Australia the situation is similar with very strong resistance being found in the eastern states due to continued fumigation in poorly sealed silos. In Western Australia weak resistance to Phosphine is widespread and increasing slowly.

Phosphine resistance however does not mean you cannot use the gas against grain insects—only that you MUST use it in a <u>tested</u> sealed silo.

Fumigation in this silo is simple and safe. Phosphine tablets (or bag chain) are loaded into the seal plate/ fumigation tray and as the gas evolves from the tablets the powder falls through the perforated platform and gas is carried into the silo up the external black thermosiphon pipe or through the butterfly grain control valve. To fumigate: **first read the phosphine label**, wear elbow length pvc gloves and full face respirator fitted with phosphine gas cartridge. Open container in open air

Silo model and size (m ³)	Tablets needed (a) 1.5g / m ³ for every fumigation.
Model 2750 (89.7)	135
Model 2250 (76.8)	115
Model 1300 (46.33)	69
Model 900 (28.8)	44
Model 550 (19.5)	29

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and tip sufficient tablets into the fumigation tray for the size of silo. (See table) Lift the fumigation tray up to the bottom of the silo and clip into place.

Leave this attached for at least

10 days while the fumigation is completed. If the grain is not needed leave the fumigation tray in place to prevent reinvasion of grain insects. Remember to wear your full face respirator when removing the tray. (see next page) Phosphine tablets

Fumigation Procedure (cont.)



Locking the phosphine chamber in place.

Adjust tension on clips by twisting the turnbuckle.

After fumigation Leave the phosphine tray attached for at least 10 days during which time the gas will release from the tablets and will move into the silo and kill all life stages of the grain insects. Before removing the grain to vent the gas from the silo put on a full face respirator and remove the seal plate/fumigation tray. Allow the silo to vent for 2 days, do not feed the grain to livestock for a further 3 days.



<u>The powder that remains is toxic and must be handled with care</u>, it contains 1% phosphine locked into the aluminium hydroxide residue and will only release in water. If you breathe it in, the phosphine will release in your lungs and make you very ill and it has been known to kill livestock when consumed.

Dispose of the powder very carefully by immersing in water containing detergent or by deep burying. If you have used a bag chain of phosphine extraction from the tray is safer but the powder inside the bags is equally toxic. Dispose by deep burying

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Safety around silos

Entering a silo is unnecessary. Dangerous gasses may be present.

Cleaning must only be done through the access hatch in the bottom of the silo.

Good grain storage as outlined in this manual will ensure the grain flows out of the silo. The small amount remaining can be easily cleaned out with a brush or water hose while standing on the concrete pad with only the upper half of your body inside the silo.

If grain has stuck to the walls make sure the top lids are open before entering the lower access hole to brush or hose out. Grain hanging on the walls indicates damp grain most likely from insect attack, moulds have developed and the grain has 'caked'. When there are moulds in a silo it is likely there are elevated levels of Carbon dioxide. Entering silos under these conditions without adequate ventilation has caused deaths.

If the grain is not flowing out properly do not enter the silo. This could also indicate damp grain and it may have 'bridged'.

Watch out for overhead power lines and use only a wooden or plastic probe to push the grain down from the top hatch.

Wear a dust mask while working inside a silo. Grain dust can lodge in the lungs and create long term health problems.

After fumigation low levels of gas remain in the grain for some time. Always allow time for the gasses to disperse before entering the silo. In the absence of sophisticated testing equipment allow the silo to vent naturally for 7 to 10 days with the top hatch open and seal plate removed before entering.

If you have to enter a silo containing grain always have a person outside the silo in case of emergency. Always use a rope tied to the exterior.

Persons who operate this silo must be fully trained in safe working procedures

Precautions

As a silo owner you have a duty of care to your workers or any other person living at or visiting your property. Warn your family, employees and visitors of the dangers of grain. Tell them to stay out of grain bins silos and trucks. Also tell them not to ride on loads of grain and to keep clear of steep walls of grain.

External ladder

The silo is fitted with a removable 'hook' ladder. The purpose of this is to prevent children being able to climb the silo. The hook ladder must be 'hooked up' out of reach of children when the silo is not being used.

Safety grids

The top access hatch is fitted with a safety grid to prevent persons tumbling into the silo. There is no internal ladder so they would remain inside until a rescue team was assembled to extract them. The grid must not be removed.

People have died in silo accidents throughout Australia. Experienced farmers can trap themselves but children and visitors seem to be at most risk from suffocation under grain. To them it seems harmless and they don't realise it can be dangerous under some circumstances.

If the grain bulk starts flowing when a person is standing on it, they can be completely submerged within seconds, jammed in and unable to breathe, SUFFOCATED.

Warning signs

This silo is fitted with appropriate warning signs. If these fade or fall off ask your manufacturer for replacements.

LOOK UP BE AWARE OF OVERHEAD POWERLINES WHEN WORKING ON TOP OF YOUR SILO. BE CAREFUL WHEN MOVING TALL EQUIPMENT AROUND BETWEEN SILOS.

It is the responsibility of the owner to ensure this silo is set up correctly.

Many problems result from incorrect preparation of the silo base pad. The results of incorrect mounting have sometimes been total collapse of the silo.

Elevated silos are a fully stressed structure engineered to support grain in a vertical plane with pressure exerted and distributed evenly around the base support frame. A pad that is not level will transfer the weight of the grain to the low side of the silo and place excessive stresses on the lower sheets of the silo.

An uneven pad will also increase the pressure in one area, twisting the base frame and deforming the silo. The effects may not be seen for some time, probably not until extra stress is placed on the silo wall when outloading product with a high bulk density. This localised force may burst seams or compressed lower sheets causing the silo to tilt and possibly collapse.

Silo Pad

The most important step in establishing a silo is to construct a good quality pad. The site selected for erection of the silos should be a stable, level site with no chance of erosion from water run off. Care must be taken in siting the silo to avoid soft and expanding soils. Consult the local shire engineer for advice on the strength of the subsoil at the site. For establishment on a difficult site the farmer should engage the services of a consulting engineer.

Site preparation

Clear vegetation from an area 1 m (3 ft) larger than the pad, grade it 100 mm (4") below ground level to provide a level area for the slab and adequate drainage away from the pad edges. A layer 30 - 50 mm (1 1/2 - 2") deep of good draining material (sand or blue metal dust) should be placed on the base and compacted by watering and rolling. Alternatively in a clay area place a plastic ground sheet on the compacted soil to help prevent drying and cracking of the subsoil and pad.

Construct the concrete pad <u>exactly</u> to manufacturer's instructions. Failure to adhere to instructions will void the warranty.

Products stored

This silo is designed to hold cereal grains or other commodities as specified by the manufacturer, **fertiliser must not be stored in this silo under any circumstances.**

Check with the silo manufacturer if the commodity you are planning to store is heavier than usual

Annual checks

Silos must be inspected regularly for corrosion. Corrosion of the lower sheets of any silo may eventually lead to failure. Once a year pressurise your sealed silo to check for leaks—see page 6. This silo is guaranteed sealed when we place it on your silo pad but like all machinery is vulnerable to damage and wear and tear. The rubber gaskets in the lower seal plate/fumigation tray and top lid can be damaged in use or wear out over time.

Silo Modifications

Silo modifications, such as installing aeration must not be attempted without taking the advice of the manufacturer. Any unauthorised modifications void the manufacturers responsibility to this silo.

Aerating sealable silos.

When aerating grain is a sealable silo, remove the top hatches or open the exhaust vents before turning on the aeration fans. Isolate automatic aeration controllers, if they are fitted, when the silo is sealed up for fumigating. Fit sealing covers over the fan inlets and exhaust vents when testing or gassing the silo.