GRAINSAFE
STORED GRAIN MANAGEMENT

Sealed silos for successful fumigation

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Fumigation in well-sealed silos controls stored grain insects cheaply, easily and reliably. Controlled atmosphere insect control using gases such as carbon dioxide (CO_2) also needs sealed storage.

▶ Why sealed storage?

- Controls **all** insect stages (eggs, larvae, pupae, adult) - not just adults;
- Uses less fumigant, so costs are lower;
- Needs less time - fumigant tablets can be placed on top of grain;
- Prevents easy insect entry;
- Avoids stored grain insecticides.

▶ Buyer's checklist

✓ Pressure relief valves are essential - temperature changes alter the internal air volume and pressure in sealed storage;

✓ Choose hatches and outlets that seal easily - sturdy lids with simple hold-down springs or adjustable toggle clamps;

✓ White or Zincalume® silos reduce internal temperatures more than galvanised silos - steady, low temperatures reduce gas loss and preserve grain quality;

✓ Sealed silos ***can*** be aerated - use easily sealed roof vents to exhaust air;

✓ Factory-sealed transportable silos are cheaper to seal than those built on-site;

✓ Get a performance guarantee from suppliers, including a gastightness test.

▶ Testing for gastightness

A simple pressure test shows whether silos are sufficiently gastight for fumigation.

Silos which don't pass the pressure test are not suitable for fumigation.

Gastightness test for new and existing on-farm sealed silos

(1) Slightly pressurise storage - 250 pascals is suitable (About 25 mm difference in fluid levels);

(2) Time until difference in fluid levels is half the original value - about 12.5 mm or 125 pascals;

(3) Check that the time exceeds five (5) minutes (empty silo) or three (3) minutes (full silo) - if not, look for leaks.

Note: Test pressures are in pascals (Pa) NOT kilopascals (kPa)

Beware of changes in temperature or sunlight intensity during the gastightness test. They can significantly affect the results.

For example, cloud cover after starting a gastightness test will reduce sunlight intensity causing rapid pressure drop.

For those who rise early, before sunrise is a good time to test due to the relatively stable air and storage temperatures at that time.

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▶ Using sealed silos successfully

- Sealed silos don't 'suffocate' grain insects - they use fumigants (e.g. phosphine) or controlled atmospheres) to kill insects;
- Treat grain as soon as possible after filling or adding extra grain - no more than two weeks;
- Store dry grain only in a sealed silo (12% is the upper limit for most grain);
- Open a top hatch when outloading to avoid pressure drops which could collapse the silo;
- Only use recommended fluids (usually light hydraulic oil or paraffin) in pressure valves - never use vegetable oil as it may solidify;
- Leave empty silos unsealed;
- Keep silos sealed after fumigation (unless moisture is a problem or aeration is fitted) - insects re-infest unsealed storage;
- Grain treated with a liquid or powder protectant also stores safely in sealed storage;
- Use the recommendations for phosphine fumigation given in *GRAINSAFE* Bulletin GS010.

▶ Regular maintenance

✓ Check hatch, outlet and door seals; fluid in pressure relief valve;

✓ Watch oil level in pressure relief valve - variations during the day usually mean that the silo is sealed (gas will usually bubble through oil as sun hits the silo each morning);

✓ Perform a gastightness test at least annually - earlier if any problems are suspected.

▶ Moisture in sealed silos

Moisture enters grain storages from several sources, including:

- Grain stored at excessive moisture content (aim for 12% or less with most grains); pockets of damp grain also cause problems;
- Insect infestations, even at low levels - insects produce moisture and heat;
- Silo structure leaking or a hatch not secured - leaky silos aren't gastight so fumigation may fail;
- Hot grain from a dryer delivered direct to silo may cause condensation as the grain cools.

Check for tell-tale signs of moisture problems:

- discolouration or sprouting at top of grain;
- condensation on inside of roof;
- 'musty' smell.

Excess moisture in stored grain causes quality loss, regardless of the type of storage

'If in doubt, get it out'

Sealed silos are less forgiving than other silos when excess moisture is present - once in, the moisture cannot escape easily, unless aeration gear is fitted.

White or Zincalume® silos (both sealed & unsealed) reduce the risk of moisture-related problems in clean, dry grain.

Low grain moisture, effective insect control, controlled aeration and regular maintenance prevent moisture problems in silos

▶ Silo safety

- Use warning signs during fumigation or CA control of insects;
- Air the grain before moving it, preferably using forced ventilation;
- Don't enter silo - take particular care during fumigation.

■

see attached diagram

Checkpoints on sealed silos