



CIPC APPLICATION: A STORE OWNER'S GUIDE

Essential information for making potato stores
CIPC compliant from the 2017/18 season

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New requirements for 'active recirculation'

New controls planned by CIPC approval holders, and backed by Industry Stewardship, will mean all CIPC applications from the 2017 harvest are made using 'active recirculation' to optimise efficacy at the new pan-European lower maximum total dose (36g/t), enhance distribution and reduce the risk of Maximum Residue Level (MRL) exceedance.

What is 'active recirculation'?

'Active recirculation' is the new industry-agreed term to describe the recirculation of air (containing CIPC fog) by fans.

Research conducted by AHDB and others within the industry has shown that the correct use of fans can significantly improve the uniformity of CIPC distribution, reducing the risk of maximum residue level exceedance.

In most cases, this can best be achieved using variable speed control to slow fans down to provide a steady circulation of fog throughout the store.

The process can be further enhanced using systems to improve the uniformity of a distribution such as curtains¹ in order to prevent short-circuiting and socks to reduce vertical gradients. Balancing of airflow prior to application may be necessary, e.g. in bulk stores, to get the most even flow.

Definitions and guidance

The following definitions and guidance have been agreed by the industry:

'Active Recirculation' - for application of chlorpropham (CIPC) to stored potatoes

The active, even movement and recirculation of airflow, through stored potatoes, during and after chlorpropham application (until the fog has cleared) accomplished via any suitable mechanical means in order to improve application uniformity and maximise product efficacy.

Practical Description for Box Potato Stores

Provision for 'active recirculation' may consist of a mechanical ventilation system capable of even airflow recirculation. This may consist of a permanent / purpose-built ventilation system or a temporary ventilation system utilising auxiliary fans, plenums, or other means to allow for uniform airflow and recirculation; unmodified overhead throw systems will not be acceptable.

Practical Description for Bulk Potato Stores

Provision for 'active recirculation' may consist of a mechanical ventilation system with under-floor ducts, under-pile ducts, or other means of even, through-pile airflow and recirculation. Typically, reducing airflow velocity is recommended and can be accomplished via the use of variable frequency drives (VFDs or Inverters), or other suitable means.

The **Potato Industry CIPC Stewardship Group** includes representation from:

Aceto Agrochemical Corporation

AHDB

Arysta Lifesciences UK

Certis UK

DormFresh

Fresh Potato Suppliers' Association

National Association of Agricultural Contractors (CIPC Applicators Group)

National Farmers' Union

Potato Processors' Association

Red Tractor Farm Assurance

United Phosphorus

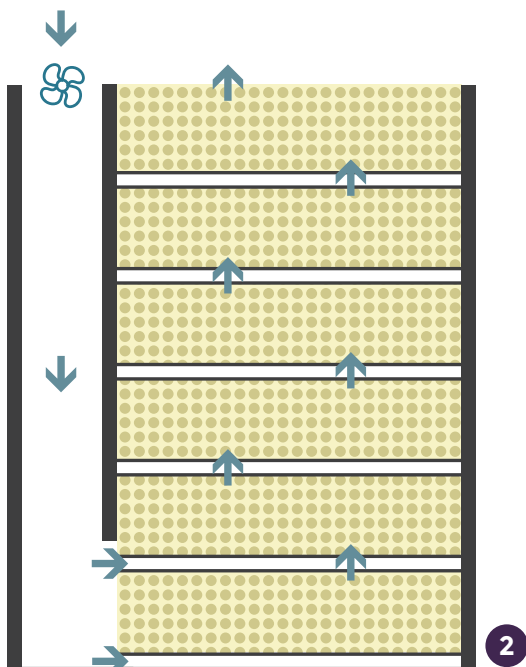
University of Greenwich

Box storage: positive ventilation

Positive ventilation is the best way of achieving 'active recirculation'. It has provided the best results in trials in achieving the most uniform distribution of CIPC in box stores. However, it is important to understand that positive ventilation imposes a resistance (back pressure) to flow and therefore there has to be a sufficient pressure generated within the 'active recirculation' system to overcome this resistance, otherwise uniform distribution will not be achieved.

Examples of positive ventilation include **letterbox-style systems** (normally limited to 8/10 boxes max. from the duct to be effective) or **lateral suction systems** **1** where air is sucked sideways through the box through slatted end panels.

Experimentally, good results have also been obtained in AHDB-funded trials by Sutton Bridge CSR using a sealed block of boxes with air forced into the two lowest base slots of the boxes. **2**

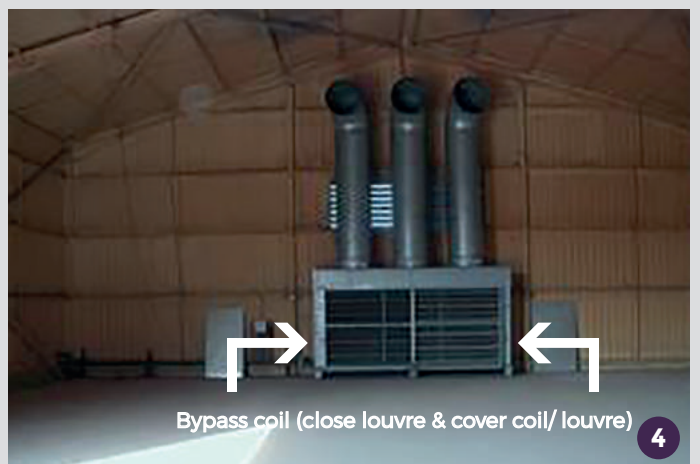


Box storage: open suction

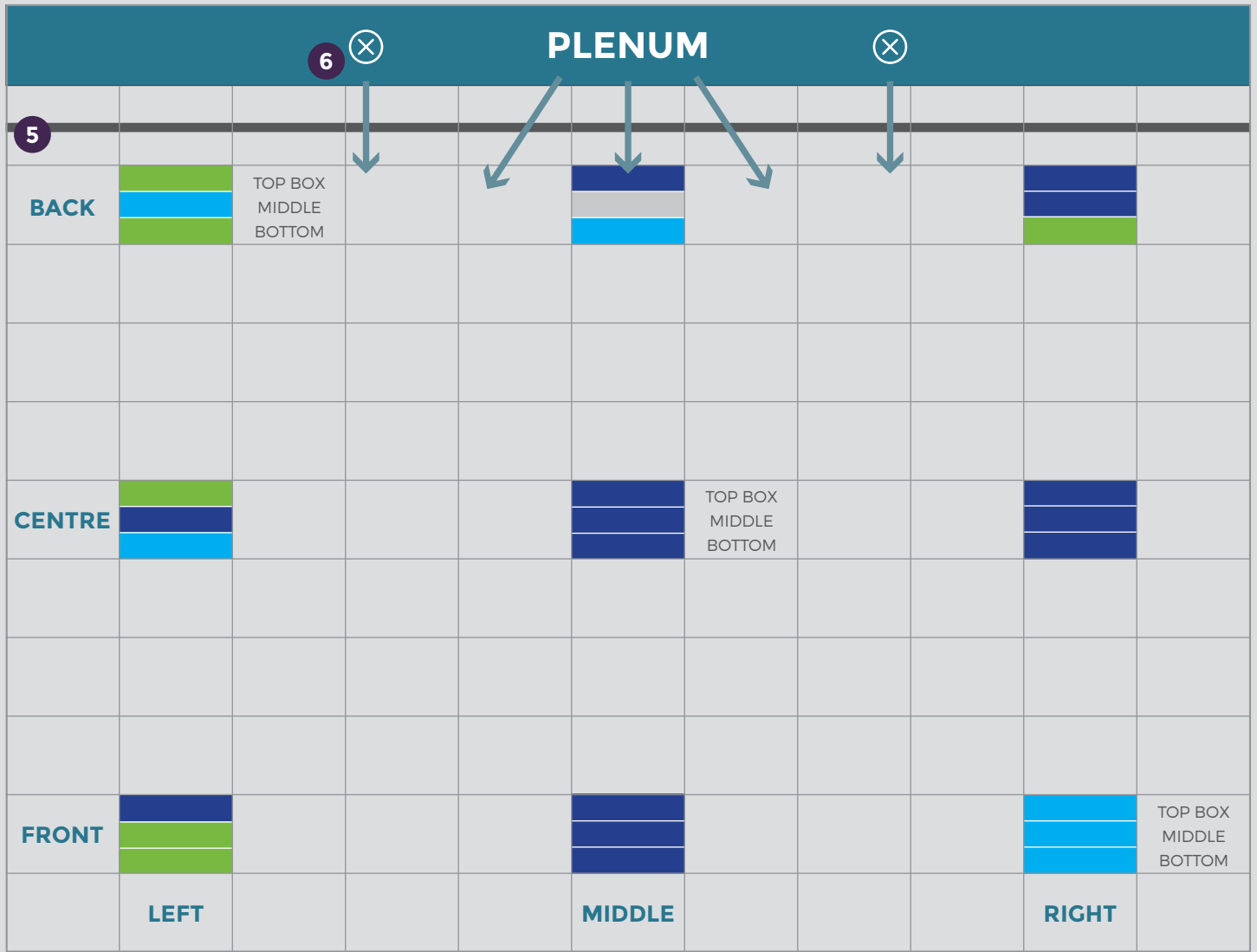
Creating an open suction system is an alternative, cheaper way to provide 'active recirculation' for overhead throw box stores. These are conversions which, to varying levels of sophistication, close off the opportunity for air to short-circuit back to the fan. Boxes are arranged with either a **plenum** at the end(s) of the store or an **'air divider' curtain** **3** is fitted to close off the short-circuit back to the fan.

The system relies on the open pallet apertures within the boxes to convey the CIPC to the target. As the slots are open, it is not positive ventilation. Circulation is best enhanced using a slow speed fan (typically running at 25-50% of normal ventilation speed) to drive the chemical along the pallet slots. This can be a speed-controlled main ventilation fan or a dedicated fan fitted for the purpose.

In refrigerated stores, it is recommended to bypass the fridge coils if possible **4**. If not, fitment of separate, dedicated fans for fog recirculation (as in the example on the following page) is preferable.



Open suction: trial results (schematic)

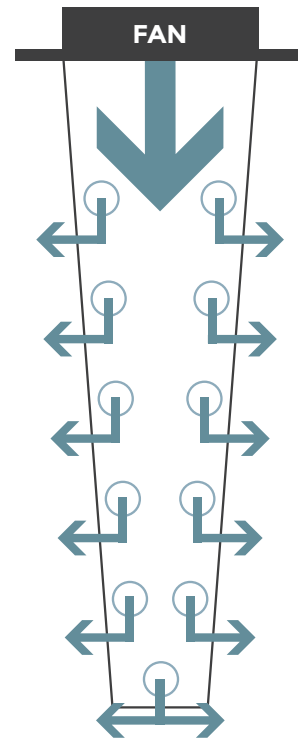


Box storage: plenums

A **plenum** is an enclosed space or duct built for the purposes of distributing air. Creating a plenum within a box stack can be a useful way of distributing CIPC fog as it allows the treatment to be introduced directly into the box pallet slots on one or both sides of the plenum.

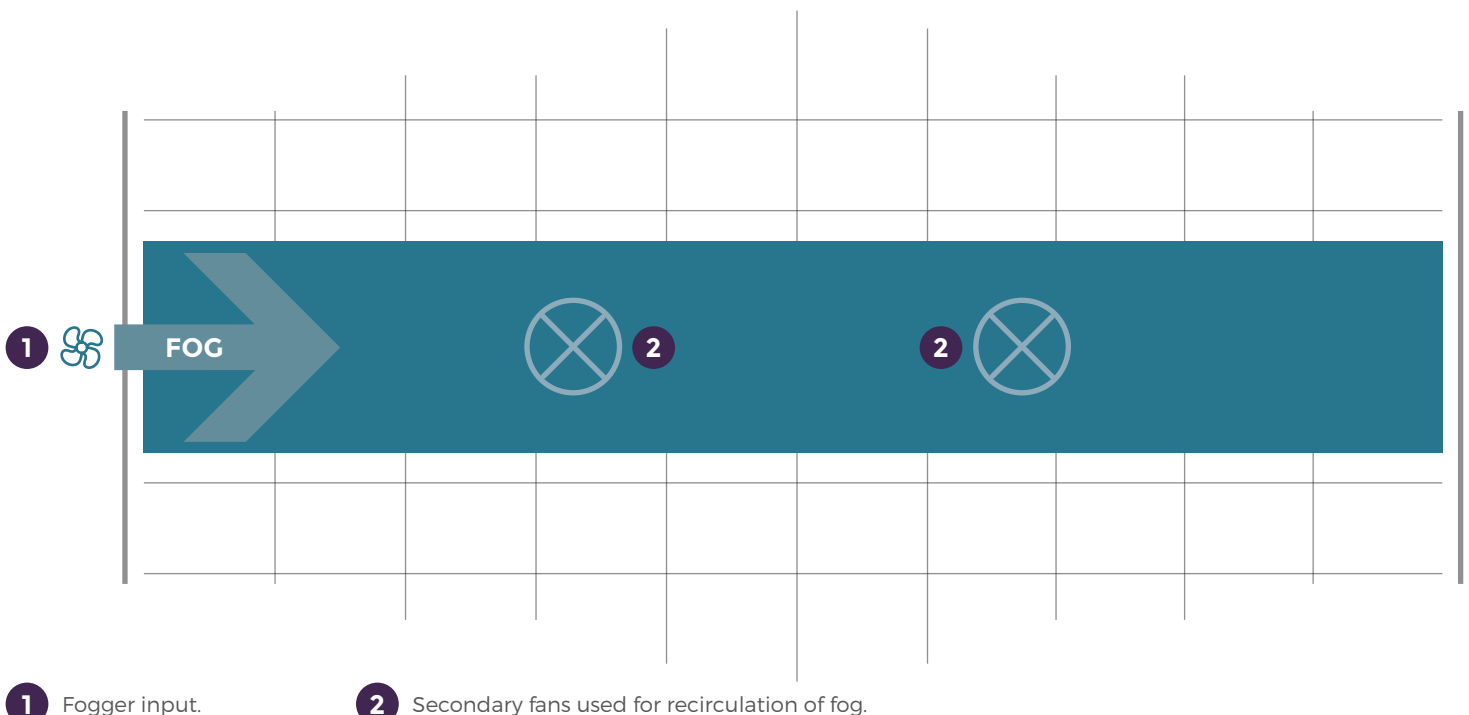
Plenums can be created in the centre of a block of boxes by leaving a gap of c 450-600 mm wide and covering it with a light tarpaulin cover. Ideally, access to the plenum is needed from the other side of the wall to allow the fog to be applied through a gassing port; liaise with your fogging contractor over these arrangements before cutting holes in the building fabric. Health and safety regulations must be complied with when fitting covers to plenums; if this is problematic, use open suction instead.

A cover helps to reduce the risk of large quantities of CIPC fog entering the roof space and settling onto the top surface of the boxes. A secondary fan within the plenum can then be used to provide 'active recirculation' of the fog through the stack (see below).



When a fan runs, the air it moves will travel in a straight line unless it is prevented from doing so. In a plenum fitted with a vertical fan, this means air flow is biased to floor level. A 'sock' fitted to the fan (above) reduces velocity pressure generated by output from the fan and, instead, builds static pressure within the sock. With the help of correctly sized and spaced outlets and a tapered shape, any vertical airflow gradient can be reduced.

Achieving active recirculation during fogging using a plenum



1 Fogger input.

2 Secondary fans used for recirculation of fog.

Bulk storage

The best way to apply CIPC fog in bulk storage is to use low-speed, 'active recirculation' through the bulk pile. This can provide a very even distribution of CIPC giving good sprout control at low dosage rates, minimising the risk of CIPC residue problems.

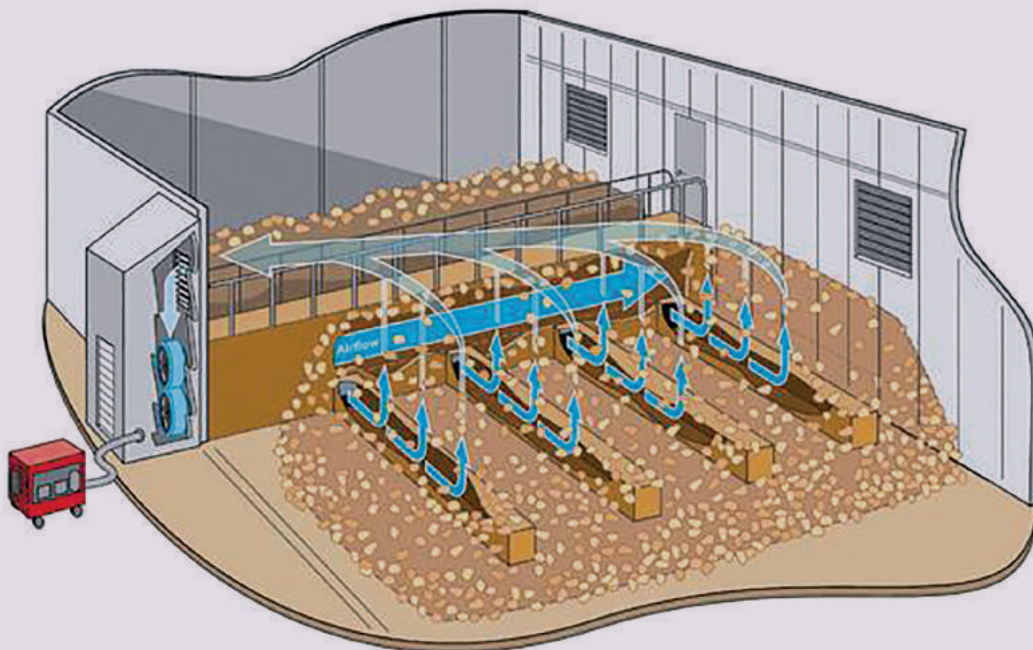
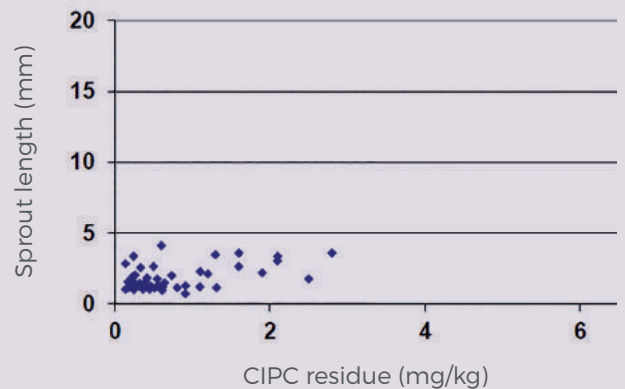
Low speed recirculation is usually achieved through the use of a variable frequency drive or inverter fitted to the main ventilation fan. In some stores fitted with multiple fans, speeds may be sufficiently low not to need this. However, if air speeds are too high, there can be a risk of chemical depositing on fan guards and duct outlets to such an extent that the flow becomes blocked. Consult with your application contractor if you need advice on how best to achieve active recirculation in your bulk store.

Before treatment, the airflow into lateral ducts must be balanced for the ventilation rates employed during application. Close individual lateral doors to get as uniform an air volume as possible along the length of the duct. This can be done whilst using an anemometer to measure air speeds into each lateral (air volume is calculated by multiplying the air speed by the open cross-sectional area of the duct). Some CIPC contractors may offer this service.

Be CIPC Compliant

Ultimately, the objective of stewardship is to achieve a safe combination of effective sprout control and low CIPC residues as shown in this graph, taken from AHDB trials on the use of active recirculation by SBCSR.

Effective application of CIPC can achieve this using the new, reduced dose rates being introduced in 2017. Make sure you can **BE CIPC COMPLIANT**.



More information on CIPC Stewardship is available at cipccompliant.co.uk