

# Checklist for Swine Barns with Air Filtration Systems



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## Audit of Engineering and Biosecurity Elements



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## **Checklist for Swine Barns with Air Filtration Systems**

This checklist is meant to help you optimize the performance of your swine building under filtered air by inspecting various components regularly. The key issues addressed in the checklist concern the building, equipment and biosecurity.

The objective of this list is simple: you have to evaluate whether the items are being complied with or if corrective action needs to be taken to follow up on your observations.

Before visiting, look over the different items on the checklist and prepare data sheets according to the building or the room that you are to audit.

Before beginning the audit, you need to obtain smoke tubes. These single-use tubes create the smoke that will allow you to check the different potential sources of infiltration of contaminated air into your building. Photos taken during the audit will help you to easily identify the potential air infiltration locations in order to prepare an audit report with findings and recommendations.

Audited by: \_\_\_\_\_

Date : \_\_\_\_\_

Building/Unit area: \_\_\_\_\_

### Engineering Audit (Building and Equipment)

<i>Before Air Filtration System Goes Into Operation</i> Inspection Items	Check if compliant	To Do or to Correct
During upgrading and installation of filters, an engineer or technician made regular supervisory checks to make sure the right methods were being used. It is difficult to confirm the airtightness of the filter boxes afterwards.		
An inspection of the air filtration system was carried out with the design engineer at installation end (checking the work for compliance).		
An inspection of all the buildings was carried out with the design engineer to ensure that all potential entries of contaminated air are sealed (access doors, windows, feed line pipes, backdraft dampers for fans, etc.)		
An inspection of the loading/load-out bays was done with the design engineer to prevent potentially contaminated air inflow when receiving or shipping animals or equipment.		
An inspection of the building infrastructure was done with the veterinarian to ensure that the premises meet the prescribed biosecurity protocol.		

<b>Implementation of the Air Filtration and Ventilation System Inspection Items</b>	<b>Check if compliant</b>	<b>To Do or to Correct</b>
<p>Starting up and calibrating the ventilation system</p> <ul style="list-style-type: none"> <li>• Air inlets are adjusted to maintain a static pressure of less than 0.10–0.15 inches of water, in accordance with the air distribution pattern to promote animal well-being.</li> <li>• Programming of electronic controllers has been confirmed.</li> <li>• The static pressure obtained corresponds to what was specified in the design.</li> </ul>		
<p>Operators and employees' training</p> <ul style="list-style-type: none"> <li>• The design engineer trained the operators on the operation, adjustments, maintenance and inspections of the ventilation and air filtration system.</li> </ul>		
<p>Maintenance and repairs to anticipate</p> <ul style="list-style-type: none"> <li>• The maximum static pressure (amount of clogging) at which cleaning becomes necessary or the filters and prefilters need replacing was determined with the design engineer.</li> <li>• To monitor clogging of the filters or pre-filters, there is a <i>weekly</i> logbook recording the static pressure at maximum ventilation for each unit area.</li> <li>• A <i>daily</i> logbook records the minimum and maximum unit area temperatures in order to detect abnormally high temperatures and clogging problems.</li> <li>• Arrangements have been made for regular inspections of pre-filters and filters to ensure they are undamaged.</li> </ul>		

<b>Post-Installation Follow-up Inspection Items</b>	<b>Check if compliant</b>	<b>To Do or to Correct</b>
<p>An inspection program (routines and frequency) is in place</p> <ul style="list-style-type: none"> <li>• There are regular inspections of the air filtration system (ideally, each month) and potential sources of air infiltration (every 6 months).</li> <li>• There is an outside inspection of the premises during spring and autumn (vermin holes, condition of concrete, etc.)</li> <li>• Frequency of inspections is respected.</li> </ul>		
<p>Air filtration system (filters, prefilters, filter boxes and housings)</p> <ul style="list-style-type: none"> <li>• Prefilters and filters are held in place correctly (fasteners) to prevent air leaks.</li> <li>• Filter media is in good condition (no holes or tears).</li> <li>• The state of pre-filters (dust accumulation) has been noted and they will be replaced if too dirty or if causing a too high pressure drop (plan prefilter replacement every 6 months).</li> <li>• The filter replacement method was worked out with the engineer to prevent entry of potentially contaminated air during this short period (planned filter replacement every 3 years).</li> <li>• Have your filters (a few samples) tested on a test bench that is recognized by your engineer to determine the end of their life cycle.</li> </ul>		
<p>Exterior doors</p> <ul style="list-style-type: none"> <li>• Door frames are airtight.</li> <li>• Unused doors are sealed properly in a way that will not cause safety problems in the event of fire.</li> </ul>		
<p>Exterior windows</p> <ul style="list-style-type: none"> <li>• Exterior windows are sealed properly</li> <li>• Windows must not open unless a filter is installed in front of them.</li> </ul>		

<b>Post-Installation Follow-Up Inspection Items</b>	<b>Check if compliant</b>	<b>To Do or to Correct</b>
Junctions in buildings <ul style="list-style-type: none"> <li>• Wall-ceiling junctions are all caulked appropriately.</li> <li>• Wall-foundation junctions are all properly sealed.</li> <li>• All the joints between the plywood sheets are appropriately sealed.</li> </ul>		
Concrete <ul style="list-style-type: none"> <li>• Cracks and the control joints are appropriately sealed.</li> </ul>		
Holes in the exterior walls <ul style="list-style-type: none"> <li>• The perimeters of all pipes and conduits that pass through exterior walls are properly caulked.</li> <li>• All other openings are appropriately sealed.</li> </ul>		
Entry of people (procedure) <ul style="list-style-type: none"> <li>• The entry procedure is clear and posted in full view at the entry point (poster).</li> <li>• There is a double-door system (SAS) with sealing strips around the perimeters and along the thresholds.</li> <li>• An air purifier with HEPA filter is installed in the office or vestibule area (air recirculated through a HEPA filter).</li> </ul>		
Loading/load-out bay <ul style="list-style-type: none"> <li>• Enclosed area (SAS) that is ventilated under positive pressure at all times. In addition, when the door is open, the speed of airflow towards the outside of the building is sufficient (minimum 100 ft/min).</li> <li>• When the area is ventilated under negative pressure (filtered air inlet), there are at least 3 programmed air changes before the inner door opens after the exterior door closes.</li> <li>• The procedures for load-in and load-out of animals are clearly displayed and applied.</li> </ul>		

<b>Post-Installation Follow-Up Inspection Items</b>	<b>Check if compliant</b>	<b>To Do or to Correct</b>
Fans ( housings, shutter components and anti-backdraft systems) <ul style="list-style-type: none"> <li>• The perimeter edge between the fan housing and the wall is airtight.</li> <li>• The shutter frames are in place.               <ul style="list-style-type: none"> <li>– No missing or broken shutters</li> </ul> </li> <li>• A recognized and effective anti-backdraft system was installed (check with engineer).               <ul style="list-style-type: none"> <li>– The system is working properly.                   <ul style="list-style-type: none"> <li>▪ No obstacle (ice, dirt) is preventing the system from closing tightly.</li> </ul> </li> <li>– The system is in good condition (nothing broken).</li> </ul> </li> <li>• Tight winter covers are installed on fans running on stage 3 or higher.</li> </ul>		
Interior wall linings <ul style="list-style-type: none"> <li>• Airtight lining material</li> <li>• If corrugated plastic (relatively low level of airtightness), ensure there is a vapor barrier and thermal insulation.</li> </ul>		
Manure disposal pipe <ul style="list-style-type: none"> <li>• Measures have been taken to ensure there is no backflow of air through the disposal pipe that carries manure from the building to the pit.</li> </ul>		
Aeration vent for the manure removal pipe network <ul style="list-style-type: none"> <li>• There is a filter installed on the end of the aeration vent when it is installed outside and the filter is protected against the sun and weather.</li> </ul>		
Air conditioning system installed in the office area <ul style="list-style-type: none"> <li>• Recirculates the inside air (must not intake unfiltered outside air)</li> </ul>		

<b>Post-Installation Follow-Up Inspection Items</b>	<b>Check if compliant</b>	<b>To Do or to Correct</b>
Deep pit manure pump-out port (manure is stored under the slats) <ul style="list-style-type: none"> <li>• There is no possibility of backflow of air toward the interior of the building.</li> <li>• The pit cover is held tight and in good condition.</li> <li>• A procedure is in place to prevent infiltration of unfiltered air into the building when pumping manure.</li> </ul>		
Access hatch to the attic <ul style="list-style-type: none"> <li>• Access to the attic through the interior of the building is sealed off and caulked appropriately. Attic access must be from outside the building.</li> </ul>		
Vermin holes <ul style="list-style-type: none"> <li>• All rodent holes are properly repaired and blocked as soon as they are discovered.</li> </ul>		
Various exhaust vents (dryer vent, fans in the showers and toilets, etc.) <ul style="list-style-type: none"> <li>• A filter is installed on the ends of exhaust vents from the outside. Filter is protected against the weather.</li> <li>• Check with your engineer that the selected filter is adequate and does not cause a problem (e.g. create a fire hazard).</li> </ul>		

## Biosecurity Audit

<i>Controlled Access Zone (CAZ)</i> Inspection Items	Check if compliant	To Do or to Correct
There is a clearly demarcated perimeter area around the building.		
There are lockable barriers on all access roads.		
There is clear signage which indicates that the site is under a biosecurity program and all unauthorized access is prohibited.		
Signs include a phone number to reach a person in authority.		
The site is organized to restrict foot traffic along the route of the delivery and pig transport trucks on the site.		
<i>Restricted Access Zone (RAZ)</i> Inspection Items	Check if compliant	To do or To correct
There is clear signage indicating that all unauthorized access to the building is prohibited.		
There is clear signage showing the procedure to be followed for entering the building.		
All doors to the building are locked at all times.		

<b>Decision Chain of Command Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
The biosecurity protocol is in writing.		
The herd veterinarian of the farm has approved the protocol.		
There is one person responsible for implementation of biosecurity protocols on the site. This person is also responsible for ensuring the airtightness of the building, together with the proper functioning and maintenance of the air filtration system. The person has previously undergone appropriate training for the position.		
The person in charge of biosecurity ensures that the protocols are being applied at all times.		
The person in charge of biosecurity reports all equipment or building problems that affect the application of biosecurity measures to the site supervisor/manager.		
All employees report any poorly-functioning filtration equipment (backdrafting through stopped fans, air leakage, broken filters, etc.).		
Whenever anyone refuses to comply with biosecurity protocols, the person in charge immediately reports all such refusals to the site manager.		
There is a regular biosecurity audit done on the site.		
Protocols are regularly reviewed with employees.		
All new employees receive formal training on the biosecurity procedures to be applied and on the particularities of a building under filtered air.		
A biosecurity protocol was drawn up in anticipation of events, such as major renovation work or a serious problem (e.g. power outage) happening on the farm.		

<b><i>Incoming Animals</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
The herd veterinarian confirms the health status of incoming animals before each entry.		
The herd veterinarian knows what biosecurity procedures were done on the provider's stud herd and judges if they are appropriate.		
The transport truck used is washed, disinfected and dried before the animals are loaded.		
The route taken by the transport truck avoids passing close to individual swine farms or farm-dense areas.		
The transport truck makes no stops during the entire trip.		
The loading bay is designed to facilitate access to the trailer without the driver stepping outside the truck.		
The loading bay is washed down, disinfected and dried after each unloading of animals.		
The loading bay is heated before the unloading, throughout the washing and disinfection, and until the surfaces have dried.		
The loading bay is designed to allow unloading of animals while at the same time, blocking any inflow of unfiltered air into the building.		
The sections of the loading bay reserved for the transport truck driver and farm employees are clearly demarcated.		
A procedure is in place to prevent employees or the transport truck driver from infecting animals during the unloading process.		
There is a procedure to follow should there be an equipment breakdown making it impossible for the animals to be loaded without unfiltered air entering the building.		
Incoming animals go into a quarantine unit.		

<b><i>Incoming Animals</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
The health status of the animals is validated before the end of the quarantine period, using diagnostic procedures.		
Employees observe the quarantined animals <i>daily</i> to check for any sign of disease symptoms.		
The herd veterinarian is notified as soon as any abnormal clinical signs are observed in the quarantine unit.		
The quarantine unit is washed down and thoroughly disinfected between batches.		
<b><i>Outgoing Animals</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
The truck used is washed, disinfected and dried before the animals are loaded.		
The trailer does not contain animals from other sites when it arrives.		
During animal transportation the truck makes no stop en route.		
The loading bay is designed to allow the loading-out of animals, while at the same time, not allowing entry of unfiltered air into the building.		
Once the animals to be loaded are in the trailer, they cannot turn back into the building or loading-out area.		
The sections of the loading bay reserved for the transport driver and farm employees are clearly demarcated.		
A procedure is in place to prevent employees or the transport driver from infecting herd animals during loading.		
The loading bay is washed down, disinfected and dried after each loading.		

<b>Outgoing Animals Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
The loading bay is heated before loading, during washing and during disinfection until all surfaces are dry.		
There is a procedure to follow should there be an equipment breakdown making it impossible for the animals to be loaded-out without unfiltered air entering the building.		
<b>Semen Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
All semen comes from a CFIA-accredited insemination centre.		
The insemination centre is certified PRRS-negative.		
The herd veterinarian is familiar with the biosecurity procedures in force at the insemination centre and deems them appropriate.		
The herd veterinarian knows the diagnostic monitoring procedures carried out at the insemination center and deems them appropriate.		
There is a designated drop-off area where the courier can leave the semen without entering the building.		
There is a system in place that lets the courier drop off the semen without any unfiltered air entering the building.		
There is a procedure for removing the semen from the packaging without contaminating it and before bringing it into the unit area where the animals are kept.		

<b>Visitors and Employees Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
After visiting another pig farm, employees and visitors observe a down period set by the herd veterinarian, before they can enter the premises.		
The herd veterinarian determines the appropriate down time.		
The entry procedure lets people enter without unfiltered air also entering the building.		
A doorbell outside the building lets visitors signal their arrival.		
Farm employees can speak to visitors via an intercom, and so avoid going through the Danish entry themselves and not jeopardize the filtration system.		
All visitors are thoroughly briefed on the biosecurity procedure they must follow before they go through the Danish entry.		
Employees can unlock the outside door remotely, without going through the Danish entry.		
A visitor's log is maintained; all visitors sign in and record their names, phone numbers and dates when they last visited a farm.		
At the very least there is a clearly demarcated Danish entry to be respected before entering the building.		
Boots and outerwear stay in the outer zone (vestibule).		
Jewellery, glasses, cell phones and other personal items are left in the outer (vestibule).		
Hand washing or showering takes place in an intermediate zone.		
Farm-dedicated clothing and boots are provided and put on in the inner zone.		

<b>Visitors and Employees Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
Each of the three zones (outer, intermediate and inner of the Danish entry) is clearly demarcated.		
Employees and visitors <i>always</i> follow the clean entry procedure.		
There is a procedure in place for employees who take care of the animals in the quarantine unit.		
The procedure for the employees who go into the quarantine unit includes a boots and clothes change between units.		
The procedure for the employees who go into the quarantine unit includes hand washing.		
The procedure for the employees who enter the quarantine unit includes a wait time period before returning to the herd.		
The procedure for the employees who go into the quarantine unit includes a procedure to be followed in the event of health problems.		

<b><i>Pest Control (vermin, insects and birds)</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
No domestic animals (e.g. pets), apart from the pigs, go into the RAZ.		
There are no openings in the building's exterior envelope that can let vermin and birds get into the building or the attic.		
All air inlet openings (under the eaves) are covered with a ½" x ½" metal mesh.		
The condition of the mesh (whole, undamaged) is checked regularly.		
All doors close tightly to prevent entry of vermin and stray air.		
There are no areas in the facility where the manure can build up.		
There are no areas in the CAZ (apart from the manure pit) where manure can build up.		
Feed bins do not provide entry points for birds or rodents.		
A professional exterminator carries out a regular rodent control program.		
Bottoms of the feed bins are free of feed residues.		
Walkways and alleys in the building are cleaned daily to prevent any water, manure and food build up.		
There is no rotting vegetation around the building.		
Vegetation around the building is kept cut short.		
There are no materials or debris lying about that can provide hiding places for rodents.		
Provision has been made for the exterminator to have access to the attic by the outside of the building.		

<b>Equipment, Materials, Supplies and Tools Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
Equipment, materials, tools, or supplies never go directly into the building.		
There is a designated material and equipment reception area which reduces the risk of the delivery driver infecting the herd.		
There is a procedure to prevent unfiltered air from entering the building during delivery of equipment and material.		
All tools and equipment to be brought inside is thoroughly disinfected before being taken into the RAZ.		
The materials receiving area is heated to 21° Celsius		
All tools and equipment to be brought in is left for 24 hours at room temperature before it is taken into the RAZ.		
No packaging taken into the RAZ.		
Only the necessary minimum number of tools remains in the RAZ.		
Only unopened bottles of medicines and vaccines are used.		
There is a lasso at the facility.		
Supplies of material have not come from another farm.		
Drugs and vaccines do not come from another farm site.		
Tools used for regular maintenance and repairs are available on the premises.		
Tools used only occasionally (rentals, subcontracting) are disinfected before coming into the premises (contact time of 24 hrs.).		
Paper and pencils are available for visitors.		

<b><i>Water, Feed and Bedding</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
Feed is stored in bins that are proof against wild animals, vermin and birds.		
Feed delivery invoices are deposited in a mailbox outside the RAZ.		
Bags of feed are delivered to the materials receiving area or to another area designed to eliminate the risk of the delivery driver infecting the herd.		
Bagged feed is delivered in such a way that no non-filtered air infiltration enters the building.		
Only the feed in the bags goes into the RAZ.		
Water comes from an artesian well and is treated before being distributed in the building.		
Bedding is stored in a place inaccessible to birds and rodents.		
No human foodstuffs are taken into any animal unit areas.		
No untreated food waste or table scraps are fed to the animals.		
<b><i>Manure Management</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
There is a separate access route to the manure pit, different from the entryway taken by employees and visitors.		
Manure spreading equipment is cleaned and disinfected before being used at the site.		
There are plugs on all pit drains to prevent outside air infiltration into the building.		

<b><i>Dead Stock and Waste</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
There is a procedure for removal of dead animals and afterbirths (placentas) from the RAZ without risk of infecting the herd.		
There is a procedure for removing dead animals and afterbirths from the building without causing an inflow of unfiltered air into the building.		
A different door is used to take out dead animals and afterbirths. It is not used for the entry of people, for the loading bay or for equipment delivery.		
Dead animals and afterbirths are kept in a closed container until they are disposed of.		
The dead stock container is located outside the CAZ.		
The rendering truck never enters the CAZ.		
<b><i>Washing and Disinfection</i></b> <b>Inspection Items</b>	<b>Check if compliant</b>	<b>To do or To correct</b>
Each unit area of the facility is thoroughly cleaned and disinfected each time it is emptied (i.e. between batches), or at least once a year.		
All removable equipment is taken apart for washing and disinfection.		
Soap is used during the washing.		
The soap is diluted appropriately and verified at regular intervals.		
A disinfectant known to be effective against PRRS is used.		
Disinfectant dilution is appropriate and checked at regular intervals.		
Quality of disinfection is checked at regular intervals using agar contact sampling technique		
Water lines are disinfected on a regular basis.		