



Best Practices for Pest Prevention and Exclusion **Food Processing Plants & Distribution Centers**

The threshold level for pests in food processing plants and food distribution centers is zero. Food safety initiatives and brand protection concerns are key motivators in achieving pest free facilities. Regulations continue to emphasize the importance of pest management through more stringent rules and enforcement. The Current Good Manufacturing Practices revisions broadened the language to state that pests are not permitted anywhere in a food plant. Pest pressures in a food plant or distribution center can vary depending on the types of products stored or produced in the facility. For example food plants, which produce mainly grain based products, are likely to have more issues with stored product moths or beetles than liquid processing facilities. A liquid processor, like a beverage plant, is more likely to have issues with small flies.

Although chemical treatments and mechanical traps can be used to help battle these pests, experts agree that the most successful pest management programs will use a combination of techniques aimed at prevention, recognition and suppression. This is often called integrated pest management or IPM. The program requires not only the services of a qualified pest management firm but input and participation from food plant and distribution center staff. Pest management does not begin with the pest management firm. Pest management begins when the site is selected and continues as part of the facilities operation each and every day. Cleaning, building maintenance and exclusion will play a key role in keeping pests out and preventing infestations from becoming established.

Site Selection

The neighboring environment and attached structures can impact future pest problems and should be contemplated before the structure is even built, purchased or leased. Pest pressures at the site should be a consideration in determining site suitability for the facilities location. If the building is a quarter of a mile from a landfill or horse stable, you can expect problems with birds, flies and rodents. At the very least, designing the building with those pest pressures in mind should be understood. If problems with pigeons are expected because there is a neighboring landfill, designing signage, and reduction of protective roosting sites can be useful in preventing bird problems in the future.

There are some considerations regarding the leasing or purchase of an existing building. If the building is old with deteriorating infrastructure, cosmetic redesigns to hide these issues will not prevent pests. Major renovations may be required to prevent structural flaws from allowing pests to prosper. This is especially important when the structure is attached to another building. Although most food plants and distribution centers are free standing, there are some smaller plants and warehouses that are not. A poorly sealed building will allow their pests to be your pests. There should also be the expectation that pest defense costs will be higher for structures where pest pressures are greater.

Exclusion Methods

Selecting the right building will help with exclusion. A well designed and constructed building will help prevent pest entry. Maintaining the buildings integrity is required as long as the building is in use. An active program of pest proofing to stop pest entry is required. Many pest management professionals offer pest proofing services. In addition, they should report areas which require pest proofing when gaps in the building defenses are observed in their written reports and client meetings.

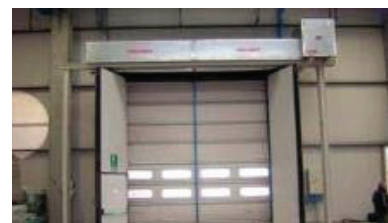
Pests do not require much space to enter a building. When sealing to prevent pests, keep in mind the target pest and the size opening it can fit through. Although pests like rats and mice may look fairly large, they do not require much space to enter through at the base of a door or at the opening around a pipe/wall juncture. It only takes a gap, the size of a quarter inch for a mouse to enter a building. If they can get their heads through the opening, their bodies will compress to fit. Use the pest proofing exclusion chart as a guide in pest proofing the exterior and interior of the building.

Seal Doors Properly

Having the proper door seals and keeping doors closed when not in use are key steps in pest prevention. Many food plant pests can be found outdoors. Gaps around the door itself can allow pests to enter and pest proofing materials like door sweeps and guards should be used to seal openings around the base and sides of doors. Automated doors, outer dock doors and rail shed doors should remain open only as long as necessary for traffic to enter and exit. A general rule for pedestrian doors is for the door to remain open for six seconds, after the pedestrian passes through the range of the electronic door sensor. The proper functioning of the door's sensor should be checked regularly to make sure it is operating properly. Doors that are staying open too long or even worse, sticking open, will allow pests like flies and rodents to enter the building. Staff should not be permitted to prop open doors for extended periods of time and training and monitoring of this practice should be required. If a door needs to be open for ventilation it should be screened. There are several good screens manufactured specifically for dock doors which can fit directly on the door track for a proper seal. In addition to proper seals being required for doors, dock plates should also be sealed. Rodents and insects can enter through the spaces around traditional dock plates. Brushes or rubber seals installed around the perimeter of the dock plate are necessary for exclusion.

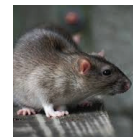
Air Curtains

Air curtains can be used to supplement a tight fitting door especially in areas where pest pressures from flying insects are high. The air curtain must be properly installed and maintained. Air curtains are not something that can be simply installed once and then forgotten. Just like an automatic door closure, overtime, they may need readjustment. A poorly functioning air curtain can be worse than no air curtain at all. If improp-

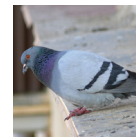


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PEST PROOFING EXCLUSION CHART



NORWAY RAT
1/2" OPENING



FERAL PIGEON
2" OPENING



ENGLISH HOUSE
SPARROW
3/4" OPENING



HOUSE FLY
5/64" OPENING



HOUSE MOUSE
1/4" OPENING



ADULT GERMAN
COCKROACH
1/16" OPENING

erly installed or adjusted, they may suck insects into the building versus keeping them out. The blade to the air curtain should be set at a 20° angle, so the air flows away from the door. The velocity of the air should be 1600 fpm of air when measured three feet from the floor as a test for proper air curtain operation.

Inspect Incoming Goods

In addition to the exclusionary methods listed above, there must be a program in place for the exclusion of pests coming in on shipments and people. A thorough inspection of incoming goods must be performed to check incoming shipments for pests as part of a comprehensive inspection for quality. Staff should have a checklist which documents each inspection. Certain pests can be adept at hitchhiking not only on products but people. Employees can bring in pests from home or when they return to the building from an exterior break. The German cockroach is one pest that is often introduced on employee belongings and may first appear in employee break room or locker rooms. Having designated areas for lunches and personal belongings is important in limiting the spread of the pest to other areas. Employee break and locker rooms should also be inspected for pest activity for this reason.

Monitoring Devices

Strategically placed pest monitoring and control devices are necessary on the exterior of the building as part of the exclusion process. These monitors are one of the first lines of defense. Key areas for placement include dumpster/ compactor areas, exterior break or eating areas and areas of dense vegetation which are planted close to the building. Neighboring properties which might have higher pest pressures due to the nature of their operation should also be considered when placing exterior control devices. Pest pressures may be higher on the side of a food plant which borders a grain mill versus the side which borders an office building. The last consideration should be the pest's ability to enter the structure. Sides of the structure where doors are more commonly opened will need greater protection and monitoring than exterior walls with no doors or openings for pest entry.

Minimize Pest Attractions Outdoors

In addition to pest proofing the structure to deny pest entry, we want to make the exterior of the structure as unattractive and uninhabitable to pests as possible. Because we cannot keep all doors closed at all times, pests will still have the opportunity to enter the building when doors are opened for people and deliveries. Making the exterior less desirable to pests can mean fewer pests around the exterior, which then can make their way indoors.

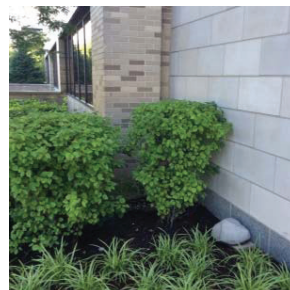
Reduce Food, Water & Shelter

All animal pests need food, water and shelter for survival. Included in the shelter category are preferred temperatures. Pests like insects are cold blooded and cannot regulate their body temperature. They will seek warmer and cooler temperatures as appropriate to maintain a favorable body temperature. This means warmth in the winter and cooler air in the summer. A common pest of food plants can be the cluster fly. This is a fall invader which will seek cracks and crevices around the exterior of the building. They enter buildings in the fall, seeking a protected location to spend the winter. The warmth of the building and contrasting colors of the exterior walls help attract these pests to the site. Other fall invaders include the multicolored Asian lady beetle, boxelder bugs, and brown marmorated stink bugs. These insects will enter structures in the fall and for the same purpose.

Food and garbage odors, water and favorable indoor temperatures can all provide attractants for pests. Pest proofing to seal the structure helps reduce air leaks which may signal to pests a more favorable temperature indoors. Keeping lids closed on dumpsters and trash receptacles is important for reducing access and odor plumes from these areas. Water leaks and proper drainage of areas should be maintained to reduce access to water by rodents, birds and other insects. Insects like mosquitoes breed in standing water. Reducing water sources can help reduce mosquitoes and other pests.

Consider the Landscape Design

Landscaping is another important consideration. Businesses take pride in having attractive properties for the enjoyment of residents, staff and visitors. However, certain landscaping materials and plants can be attractive to pests. For example, mulch used for water retention can encourage certain pests like sowbugs, termites, millipedes and earwigs. One inch or larger rock is preferred as a gravel strip. The rock should extend ½' deep and at least 2' away from the structure. Ground covers like ivy can provide harborage for rodents and insects.



Keep vegetation trimmed back and do not allow tree or shrub branches to touch the structure.

Flowering plants can attract bees, wasps and ants. Use rock versus mulch for pest prevention. Keep vegetation trim and do not allow tree or shrub branches to touch the structure. The recommendation for trees and shrubs is for a six foot clearance between the branches and the structure.

Proper Lighting to Reduce Attraction

In addition to satisfying needs for survival, pests may be attracted to structures due to light. Many insects use light to navigate and can be attracted by lights for this reason. Certain types of lights are more attractive to insects than others. Insects are more attracted to lights in the blue spectrum and less attracted to lights in the yellow range. Selecting lights towards the yellowish spectrum will help reduce the buildings attraction to insects. Mercury vapor lights are a common type of lighting which emits more light in the blue range (450-550 nm). Mercury vapor lighting should be avoided when possible, especially when lights are mounted directly on the building. High pressure sodium vapor lights are preferred (575-600 nm). Mercury vapor lighting can be 112 times more attractive to insects than sodium vapor lights. Many facilities are switching to LED lights because of energy savings. When selecting LED lights, look for lighting in the same spectrum as sodium vapor lights.

Reducing Survival Indoors

The same basic needs which may attract pests to the exterior of our structures, contribute to survival indoors. We aim to reduce available food, water and shelter indoors to prevent pest reproduction and development.

Flies

Small flies like fruit flies need moist organic material for development. Removal of the breeding source is essential for controlling these pests. Larger filth flies are not commonly breeding indoors. Typically these flies are coming in from the exterior and exclusion and reduction of attractions is key to their management. Cluster flies are one of the fall invading insects which enter buildings in search for a warm place to spend the winter. They often will orient towards the tallest building in an area, and a large office building, or apartment building may be that site. Typically these flies enter the building at the upper floors in cracks around window frames, roof flashing or other structural openings. They enter the building in late summer and early fall and may appear in office light fixtures or window sills over the winter when there are periods of thaw. Exclusion is the best defense against cluster flies.

Cockroaches

The German cockroach is classified as a domestic cockroach because they rarely live outdoors. When German cockroaches infest a facility, they typically have been carried in on goods or employee personal belongings. They prefer areas of higher humidity and moisture and will be more common in areas where there is more water used in processing or cleaning. German cockroaches are omnivorous and will feed on a wide variety of foods. It can be difficult to limit all potential food sources for this insect so a major focus is denying harborage through sealing of cracks and crevices. German cockroaches prefer areas where there is moisture and warmth. Concentrate on these preferred harborage areas when inspecting for cockroaches and sealing cracks.. Unlike their close relative the German cockroach, the American cockroach is considered a peridomestic species which can commonly be found indoors and outdoors. In the northern part of the United States, it is most commonly associated with sewers and cutting off entry into the structure through the sewers as part of the control process. In the southern U.S, it can come from the exterior or through the sewer system.

Rodents

The house mouse is the second most successful mammal on earth and the Norway rat is the third. Humans are number one and we share our successes with these pests. They easily exploit the resources that we can supply in the form of food, water and shelter. In addition to the damage they create through feeding, they can potentially contaminate food through their hair, urine and droppings. Both the house mouse and Norway rat can produce 50 or more droppings per day. Their fecal material alone provides a lot of potential contamination. In addition, they are capable of transmitting a wide range of diseases including various pathogens responsible for food borne illness. Their droppings and urine can contain these pathogens.