LANXESS

Hyperox™

Powerful Broad Spectrum Multipurpose Disinfectant

- Unique, patented, stabilised peracetic formulation
- Wide range of disinfection uses
- Exceptional effectiveness at low temperatures
- Effective in the presence of organic challenge
- Biodegrades readily within the environment



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Unique Stabilised Peracetic Disinfectant Formulation

Hyperox™ is a unique and highly effective stabilised peracetic acid disinfectant used in a wide range of animal husbandry and greenhouse hygiene biosecurity applications. Its patented formulation is highly effective against a broad spectrum of viral, bacterial and fungal disease-causing organisms, at low temperatures, and in the presence of organic challenge.

Hyperox™ provides a highly convenient multipurpose biosecurity system in a single pack for a wide range of disinfection applications including:

- Surfaces
- Equipment
- Water delivery systems
- Thermal fogging

Proven Scientific Evidence

Independently Proven Broad Spectrum Killing Power

Hyperox™ has a significant number of studies supporting approved label claims against OIE Listed Diseases, including; exotic Newcastle Disease, Highly Pathogenic Avian Influenza (Fowl Plague), Foot & Mouth Disease (FMD), Porcine Reproductive Respiratory Syndrome (PRRS), and Salmonella.

The broad spectrum efficacy of Hyperox™ has been independently proven effective against an extensive portfolio of viral, bacterial and fungal disease-causing organisms using a wide range of contact times, temperatures and organic challenge levels.

Formulated Broad Spectrum Killing Power

Hyperox™ oxidises the outer cell membranes of micro- organisms, disrupting their function and causing the cell wall to rupture leading to rapid deactivation of the disease-causing organism.

Composition

Hyperox™ is a colourless, aqueous formulation of peracetic acid, hydrogen peroxide, acetic acid and surfactant, with a vinegar-like odour.



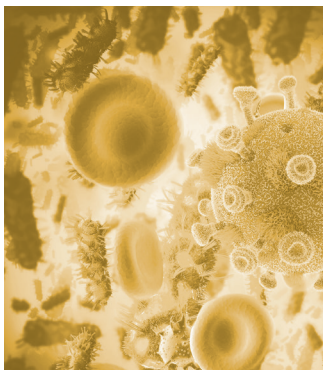
Proven to Kill on Farm as well as in the Laboratory

Proven on-farm efficacy offers producers the reassurance and knowledge that the product they are using will be effective in real farm conditions, where varying temperatures and high levels of organic challenge can present serious problems to other disinfectant technologies.

Operational Benefits

No Need for Disinfectant Rotation

There is no evidence of bacterial disease-causing pathogens developing acquired resistance towards Hyperox™, as opposed to some other common types of disinfection chemistries. Disinfectants based on both Glutaraldehyde and Quaternary Ammonium Compounds (QAC's) are known to be implicated for their ability to promote acquired resistance in bacteria, so the use of Hyperox™ would eliminate the need for disinfectant rotation.







Safety, Health & Environmental Issues

Hyperox™ is a peroxygen based disinfectant chemistry. The peroxygen active substance of Hyperox™ readily breaks down in the environment after use to simple molecules such as oxygen, water and a biodegradable organic acid and, as a result of this action, is considered to be "readily degradable" in accordance with OECD & EU standards.

Hyperox™ is recognised as being an acceptable disinfectant for organic farming applications, for the cleansing and disinfection of livestock buildings, in accordance with European Regulation No. 834/2007 on organic production of agricultural products.

Hyperox™ is a low risk product for disposal via sewage treatment in the diluted form. Toxicity data is available to demonstrate the effect on an aerobic sewage sludge, thus allowing the operation to dispose of wastes safely & within the scope of any discharge permit for the site.

Proven Activity at Low Temperatures

Hyperox™ has been independently tested and proven highly effective in a virucidal evaluation at low temperature by a respected French reference laboratory. A temperature of 4°C was purposely selected for the test as it clearly represents the cold conditions to be found on farm during winter months.

The test was carried out at Laboratoire de Microbiologique Immunologique ADREMI Tours France, comparing the efficacy of four disinfectant products; Hyperox™ and three EU Glutaraldehyde-QAC branded products.

Hyperox™ passed the tests at a dilution of 1:200 (0.5%) with the three competitive disinfectants requiring a dilution of 1:33 (3%) or less in order to be effective against the test organisms (Talfan & HCC viruses).



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General Farm applications and use guidance

Hyperox's unique formulation, broad spectrum of activity and enhanced stability make it the peracetic acid disinfectant of choice for farm; general surface, equipment, water delivery system and thermal fogging disinfection.

Application & Use Guidance

Surface Disinfection	Dilution Rate	Application
Routine disinfection for all pre-cleaned surfaces including wood and concrete	1:100 (10ml of Hyperox™ concentrate to 1 litre of water)	Using mechanical spraying equipment, apply Hyperox™ solution at an application rate of 300ml/m^2.

Example: Routine disinfection of a 1000m^2 house, with a total surface area of 2500m^2 including walls and ceiling, at a dilution rate of 1:100 and an application rate of 300mls/m^2 or to point of run-off, will require a solution consisting of 7.5 litres of Hyperox™ concentrate added to 750 litres of water. This calculation is based on typical UK conversion rates: please check your country/regional specific requirements.

Equipment Disinfection	Dilution Rate	Application
Routine disinfection of clean movable equipment	1:100 (10ml of Hyperox™ concentrate to 1 litre of water)	Spray all equipment with Hyperox™ solution to point of run-off.

Disinfectant Foot & Wheel Dips	Dilution Rate	Application
Disinfection foot & wheel dips	1:100 (10ml of Hyperox™ concentrate to 1 litre of water)	Replace solution once it has either become soiled or after a period of 2 days.

Water Systems

All water systems contain some microbial contamination, especially header tanks where dust and debris can accumulate. Disinfecting will clean the system and eliminate waterborne pathogens, including bacteria and viruses.

Water System Disinfection	Dilution Rate	Application
Terminal disinfection of water systems	1:100 (10ml of Hyperox™ concentrate to 1 litre of water)	Isolate header tank at the mains and drain off drinker points farthest from the tank. Clean out any gross soiling present from the tank. Refill with the appropriate amount of clean water, and add the required amount of Hyperox™ concentrate. In order to control biofilm build up, leave the solution for a period of 1 hour. Flush the solution to all drain points, before allowing the solution to remain in contact with the system for a further period of 1 hour. Drain, and refill system with clean water before reuse.

Thermal Fogging Terminal Disinfection

Thermal fogging is the process by which disinfectant solution is suspended within the air for a period of time in order to disinfect the surfaces of dust particles and inaccessible parts of a building.

It is the last, but most important, stage of any complete biosecurity cleaning and disinfection programme, playing a major role in disease prevention and control.

Hyperox™ has been independently tested for use in thermal fogging, under the requirements of the AFNOR test method NFT 72-281 (1986) for 'Thermonebulisation'. The data demonstrates the efficacy of Hyperox™ with an in-use concentration of 1.7ml/m^3 using different types of thermal fogging machine.

Always follow the good practices recommended in the section titled 'Thermal Fogging Machine Operation'.

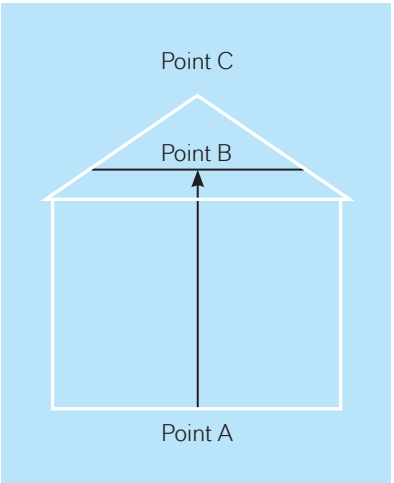
How to calculate your buildings total airspace volume for thermal fogging

The total airspace volume of a given building is the floor area multiplied by the average height.

For a pitched roof building, an average height is determined by measuring from the floor (point A in the diagram below), to halfway between the top of the buildings wall (point B), and the apex of the roof (point C): The table below indicates the volume of Hyperox™ concentrate and water required to achieve effective thermal fogging within a given size of building:

How to calculate your buildings total airspace volume for thermal fogging

Total Airspace Volume (m^3)	Volume of Hyperox™ concentrate (litres) to achieve 1:10 dilution	Volume of water to be added to concentrate (litres)
100 m^3	0.17	1.7
200 m^3	0.34	3.4
500 m^3	0.85	8.5
1000 m^3	1.70	17.0
2500 m^3	4.25	42.5
3000 m^3	5.10	51.0
3500 m^3	5.95	59.5
4000 m^3	6.80	68.0



Thermal Fogging Machine Operation

Fill the thermal fogging machine reservoir tank(s) with the appropriate volume of prepared Hyperox™ solution.

Direct the nozzle of the fogger into the building through a suitable aperture (with the air intake of the fogger situated outside of the building) and activate the motor. Allow the thermal fogging procedure to run until the reservoir tank(s) are empty. Switch off and remove the fogging machine at the end of the cycle and then close the aperture. Leave the building closed for a minimum of 30 minutes and then ventilate for at least a further 30 minutes prior to re-entering.

Do not leave the thermal fogging machine filled with disinfectant after use. Thoroughly clean it each time after use by running it for a minimum of 30 seconds with clean water in the reservoir tank(s), then empty the tank(s) ready for future use.

Proper attention to after use cleaning of the thermal fogging machine will help to prevent the corrosion of susceptible metal components and help to prolong its working life.

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Greenhouse Biosecurity

The greenhouse environment provides an ideal atmosphere in which unwanted micro-organisms can flourish.

Organisms can be introduced into the greenhouse environment from a number of sources and spread via various recognised transmission vectors.

As well as the structural framework of the greenhouse, micro-organisms can also survive on the surfaces of tools and equipment, seed trays and plant containers, and within irrigation systems. Microbial contamination may also be introduced from external sources such as vehicles, footwear, on personnel's clothing and hands, or from windborne dust and debris.

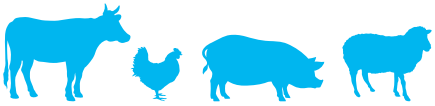
Hyperox™ may be used for the disinfection of surfaces and equipment in greenhouses. The stabilised formulation of Hyperox™ provides multi-application flexibility and broad spectrum efficacy against viruses, bacteria, fungi and spores, at low temperatures and in the face of organic challenge. These outstanding qualities make Hyperox™ the peracetic acid disinfectant of choice for greenhouse biosecurity needs.





Applications

Disinfection Task	Dilution Rate	Application
General Surfaces	1:100 (1%)	Using either a plastic watering can, knapsack sprayer or pressure washer on a low pressure setting, apply disinfectant solution to surfaces at a rate of 300ml per square metre.
Moveable Equipment	1:100 (1%)	Using either a plastic watering can, knapsack sprayer or pressure washer on a low pressure setting, apply disinfectant solution to equipment, leave for 10 minutes before rinsing with clean water and allowing to dry.
Pruning Knives	1:100 (1%)	Disinfect pruning knives at the end of each row of plants by either dipping in (not soaking), or wiping with a cloth or sponge soaked in disinfectant solution.
Seed Trays, Plant Pots & Containers (plastic)	1:100 (1%)	Submerge pre-cleaned containers in disinfectant solution for a minimum of 1 minute before removing and allowing to dry prior to re-use.
Disinfectant Foot Dips	1:100 (1%)	Replenish every 2 days, or when heavily soiled.
Irrigation system, Beds & Matting (Terminal Disinfection)	1:100 (1%)	Irrigation System – Fill irrigation lines with disinfectant solution. Leave for one hour and then flush through with fresh clean water. Irrigation Beds & Matting – apply a fine mist of disinfectant solution evenly over the entire surface area of the irrigation bed or matting.
Thermal Fogging Terminal Disinfection	1:10 (10%)	1.7 litre of disinfectant solution to every 100m^3 of greenhouse airspace

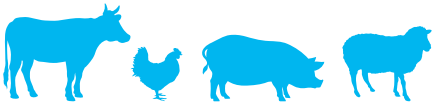


Virucidal Efficacy

Family	Genera	Organism	Strain (where noted)	Country	Comments	Dilution	Disease
Adenoviridae	Mastadenovirus	ICH virus		France	AFNOR 72-180	1:200	ICH
Birnaviridae	Birnavirus	IBD virus	DV86	UK		1:150	IBD
Birnaviridae	Birnavirus	IBD virus	DV86	USA	EPA guidelines method	1:250	IBD
Flaviviridae	Pestivirus	CSF virus		UK		1:100	Classical Swine Fever
Herpesviridae	Suid herpes virus	Pseudorabies virus		France	Agremente method	1:500	Aujesky's Disease
Orthomyxoviridae	ISA virus	Infectious salmon anaemia virus		Canada		1:256	ISAV
Orthomyxoviridae	Influenza virus	Avian Influenza virus	ATCC VR 2072	USA	AOAC	1:200	Avian Influenza
Picornaviridae	Orthopoxvirus	Bovine enterovirus type [1]	VR-248	UK	EN14675	1:100	Enteric Respiratory & Reproductive Disease
Picornaviridae	Enterovirus	Porcine enterovirus serotype [1]	PK15	France	AFNOR 72-180	1:200	Teschen Talfan Disease
Picornaviridae	Enterovirus	Polio virus	ATCC VR 192	USA	EPA guidelines method	1:128	Poliomyelitis
Picornaviridae	Enterovirus	Bovine enterovirus serotype [1]	LCR4 (ECBO)	Germany		1:200	Enteric Respiratory & Reproductory Diseases
Poxviridae	Orthopoxvirus	Vaccinia variola	Elstree	Germany	DVG test	1:200	Cowpox
Poxviridae	Leporipoxvirus	Myxoma virus		France	Agremente method	1:200	Myxomytosis

Fungicidal/Yeasticidal Efficacy

Organism	Strain	Country	Comments	Dilution
Absidia corymbifera	IP 1129.75	France	AFNOR 72-201	1:200
Absidia corymbifera	IP 1129.75	France	AFNOR 72-190	1:100
Aspergillus niger	ATCC 16404	Italy	EN1657	1:100
Aspergillus versicolor	IP 1187.79	France	AFNOR 72-190	1:100
Candida albicans	ATCC 10231	Italy	EN1657	1:200
Cladosporium cladosporoides	IP 1232.80	France	AFNOR 72-190	1:100
Trichophyton mentagrophytes	ATCC 9533	USA	AOAC method	1:256



Bactericidal Efficacy

Organism	Strain	Country	Comments	Dilution
Campylobacter jejuni	Wild strain	UK	EN 1656	1:200
Enterococcus faecalis	NCTC 8213	Holland	555- EST-V	1:200
Enterococcus hirae	CIP 58.55	France	AFNOR 72-171	1:1000
Enterococcus hirae	CIP 58.55	France	AFNOR 72-190	1:200
Escherichia coli	CIP 54.127	France	AFNOR 72-171	1:10000
Escherichia coli	O157	England	EN1656	1:200
Escherichia coli	CIP 54.127	France	AFNOR 72-190	1:200
Listeria monocytogenes	NCTC 7973	UK	EN1656	1:100
Pseudomonas aeruginosa	CIP A22	France	AFNOR 72-171	1:1000
Pseudomonas aeruginosa	ATCC 15442	Holland	555- EST-V	1:200
Pseudomonas aeruginosa	CIP A22	France	AFNOR 72-190	1:200
Pseudomonas aeruginosa	ATCC 15442	USA	AOAC method	1:256
Salmonella choleraesuis	NCTC 10653	UK	DEFRA Test Protocol	1:179
Salmonella choleraesuis	ATCC 10708	USA	AOAC method	1:256
Salmonella typhimurium	DT104	UK	prEN 1656	1:200
Salmonella typhimurium	ATCC 13311	Holland	555- EST-V	1:200
Staphylococcus aureus	CIP 53.154	France	AFNOR 72-171	1:1000
Staphylococcus aureus	CIP 53.154	France	AFNOR 72-171	1:100
Staphylococcus aureus	ATCC 6538	Holland	555- EST-V	1:200
Staphylococcus aureus	CIP 53.154	France	AFNOR 72-190	1:500
Staphylococcus aureus	CIP 53.154	France	AFNOR 72-190	1:200
Staphylococcus aureus	ATCC 6538	USA	AOAC method	1:256

Copies of the independent efficacy test reports are available upon request from LANXESS.

General Product Information

Packaging
Hyperox™ is available in 5 and 20 litre vented drums approved to UN Standards.

Storage
Store upright in a cool place out of direct sunlight, away from other chemical products. Store below 25°C.

Shelf Life
Concentrate 18 months. Diluted product 2 days, if unused.

Disposal
Dilute small quantities to waste water, via a foul sewer or other treatment facility, in accordance with local water authority regulations, or within the scope of the waste water discharge permit.

Personal Protective Equipment
Before commencing any disinfection procedure, operators must be provided with, and wear, suitable protective clothing including; coveralls, suitable protective gloves, boots, face protection (face-shield) and suitable respiratory equipment (half face mask to EN 140 with suitable vapour filter to EN141) as appropriate.

Precautions
Hyperox™ is intended for disinfection of depopulated buildings, sheds and greenhouses for the reasons of general hygiene. Hyperox™ is not intended, nor is it authorised, for uses involving the protection of plants or plant products against harmful organisms and must not be applied directly to plants or plant growth media (e.g. soil, compost).

Rinse any metal surfaces with clean water after application.

Use disinfectants safely – Before use, always read and follow the label instructions and information, including any precautionary statements.

Refer to the Hyperox™ Safety Data sheet for advice on concentrate and in-use solution handling procedures, and the appropriate personal protective equipment required for operatives, prior to the commencement of any operation involving Hyperox™.

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Energizing Chemistry

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