

MICROBIOLOGICAL PROFILE



GPC8™

Glutaraldehyde-based, general-purpose disinfectant

Edition 16: April 2025

Evans Vanodine

GPC8 MICROBIOLOGICAL PROFILE

INTRODUCTION

GPC8 is a powerful glutaraldehyde based, general purpose disinfectant.

GPC8 has a broad spectrum of activity. It is bactericidal, fungicidal and virucidal.

GPC8 is UK DEFRA approved and CEFAS listed.

GPC8 can be used in all types of livestock housing and on associated equipment.

GPC8 is designed for use as part of an effective cleaning and disinfection (hygiene) programme.

Effective in the presence of heavy organic soiling and low temperatures	Use after cleaning
Use on feeders and drinkers	Prolonged residual activity
	Non-staining and not corrosive to metal

GPC8 - EFFICACY SUMMARY

GPC8 has been tested and proven to be effective against a range of micro-organisms. European Standard (EN – European Norm*) test methods were used to prove efficacy against bacteria, viruses, fungi and yeast.

The UKAS accredited Microbiology Laboratory at Evans Vanodine International plc. (Testing number 1108) performed tests with bacteria, fungi and yeast.

GPC8 has also been tested against Leptospira and viruses at independent expert laboratories using appropriate methods.

GPC8 is approved in the UK by the Department for Environment, Food and Rural Affairs (DEFRA), for disinfection where an approved product is required <https://www.gov.uk/guidance/get-your-disinfectant-approved-by-defra>. This approval is also mirrored in Northern Ireland and Ireland by DARDNI and DAERA respectively.

The following tables include information of relevant, applicable test methods, conditions, contact times and organisms.

*EN - European Norm

Published in the UK as BS EN by the British Standards Institution.



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SUMMARY OF TEST RESULTS AGAINST AVIAN PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
<i>Enterococcus cecorum</i>	1:800	EN 1656	10	30	High
<i>Enterococcus faecalis</i>	1:800				
<i>Escherichia coli</i>	1:200				
<i>Pasteurella multocida</i>	1:400				
<i>Proteus hauseri</i>	1:250				Low
<i>Salmonella arizonae</i>	1:200				High
<i>Salmonella gallinarum</i>	1:100				Low
<i>Salmonella infantis</i>	1:100				High
<i>Salmonella pullorum</i>	1:200				Low
<i>Salmonella typhimurium</i>	1:400				High
<i>Staphylococcus aureus</i>	1:1000				Low
<i>Escherichia coli</i>	1:100	EN 16437	10	120	Simulated
<i>Proteus hauseri</i>	1:50				
<i>Staphylococcus aureus</i>	1:50				
<i>Proteus hauseri</i>	1:200	EN 14349	10	30	Low
<i>Staphylococcus aureus</i>	1:500				

VIRUS TEST PROFILE					
VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
Avian Adenovirus	1:100	In-house	Room Temp	30	None
Avian influenza virus Taiwan strain H6N1	1:220	In-house	4	30	Organic
Avian influenza virus H5N3	1:220				
Avian influenza A1 780/02	1:200	In-house	Room Temp	5	None
Avian influenza reassortant virus H3N2	1:200	In-house	20	10	None
3 Infectious Bronchitis virus	1:100	In-house	Room Temp	30	None
Infectious Bursal disease virus	1:100	EN 14675	20	30	High
Infectious Laryngotracheitis virus	1:400	In-house	Room Temp	30	None
Marek's disease virus	1:200	In-house	10	30	Organic
Newcastle Disease virus strain Montana	1:100	DVG-STAND 07.11.2017	10	30	40% calf serum
Newcastle Disease virus	1:50	DEFRA	4	30	5% Yeast

In-house tests use protocols specific for each virus.

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SUMMARY OF TEST RESULTS AGAINST BOVINE PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
<i>Escherichia coli</i>	1:200	EN 1656	10	30	High
<i>Campylobacter jejuni</i>	1:1000				
<i>Corynebacterium pseudotuberculosis</i>	1:100				
<i>Klebsiella pneumoniae</i>	1:200				
<i>Pseudomonas aeruginosa</i>	1:200				Low
<i>Staphylococcus aureus</i>	1:1000				
<i>Escherichia coli</i>	1:100	EN 16437	10	120	Simulated
<i>Pseudomonas aeruginosa</i>	1:100				
<i>Staphylococcus aureus</i>	1:50				
<i>Leptospira interrogans</i>	1:200	In-house	Room Temp	2	None
<i>Pseudomonas aeruginosa</i>	1:200	EN 14349	10	30	Low
<i>Staphylococcus aureus</i>	1:500				

VIRUS TEST PROFILE					
VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
Bovine Viral Diarrhoea virus (BVD)	1:25	EN 14675	10	30	High
Bovine enterovirus	1:100	EN 14675	10	30	Low
Foot and Mouth Disease Virus Type A and Type Asia 1	1:200				
Foot and Mouth Disease Virus O1 British field strain 1860/UK167	1:80	DEFRA	4	30	1% foetal bovine serum

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SUMMARY OF TEST RESULTS AGAINST PORCINE PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
<i>Enterococcus hirae</i>	1:500	EN 14349	10	30	Low
<i>Pseudomonas aeruginosa</i>	1:200				
<i>Staphylococcus aureus</i>	1:500				
<i>Salmonella enteritidis</i>	1:25	DEFRA	4	30	5% yeast
<i>Bordetella bronchiseptica</i>	1:200	EN1656	10	30	High
<i>Enterococcus faecalis</i>	1:800				Low
<i>Enterococcus hirae</i>	1:1000				High
<i>Escherichia coli</i>	1:200				Low
<i>Pasteurella multocida</i>	1:400				High
<i>Pseudomonas aeruginosa</i>	1:200				Low
<i>Salmonella enteritidis</i>	1:200				High
<i>Staphylococcus aureus</i>	1:1000				Low
<i>Streptococcus suis</i>	1:1000				High
<i>Enterococcus hirae</i>	1:50	EN 16437	10	120	Simulated
<i>Escherichia coli</i>	1:100				
<i>Pseudomonas aeruginosa</i>	1:100				
<i>Staphylococcus aureus</i>	1:50				
FIELD ISOLATES					
<i>Actinobacillus pleuropneumoniae (App)</i>	1:100	EN 1656	10	30	High
<i>Brachyspira hyodysenteriae</i>	1:200				
<i>Haemophilus parasius (Hps)</i>	1:100				
<i>Streptococcus suis</i>	1:800				
<i>Pasteurella multocida</i>	1:200	EN 1656	10	30	Low
<i>Staphylococcus hyicus</i>	1:100				

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VIRUS TEST PROFILE					
VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
PRRS Virus	1:200	In-house	Room Temp	30	None
African Swine Fever virus	1:50	In-house	20	30	Organic
African Swine Fever virus	1:800*	In-house	10	30	0.3% bovine serum
Porcine Circovirus Type 2	1:100*	In-house	10	30	Organic
PED Virus	1:200	In-house	4	60	None
PED Virus	1:200	In-house	25	15	None
TGE Virus	1:200	In-house	10	30	Organic
Classical Swine Fever virus	1:100	In-house	4	30	Organic
Aujesky's virus	1:250	In-house	4	30	Organic
Porcine Influenza A (H1N1)	1:400	EN 14675	10	30	High
Parvo virus	1:100	EN 17122	10	120	Clean
	1:100		20		
	1:200	In-house	Room Temp	30	None
Foot and Mouth Disease virus Type A and Type Asia 1	1:200	EN 14675	10	30	Low
Foot and Mouth Disease Virus OI British field strain 1860/UK167	1:80	DEFRA	4	30	1% foetal bovine serum
Porcine Rotavirus	1:200*	In-house	Room Temp	30	None

*NOTE Results did not meet test specifications due to limitations of each method.

SUMMARY OF TEST RESULTS AGAINST PATHOGENIC FUNGI

FUNGICIDAL TEST PROFILE					
FUNGI	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
Aspergillus brasiliensis	1:10	EN 1657	10	24 Hours	Low
	1:50	EN16438			
Candida albicans	1:200	EN 1657	10	30	Low
	1:100				High
	1:100	EN 16438		120	Low
	1:50	EN 16437			Simulated
	1:25				
Fusarium oxysporum f.sp. cubense	1:100	EN 1657	20	30	High

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SUMMARY OF TEST RESULTS AGAINST FISH PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
<i>Aeromonas salmonicida</i>	1:400	EN 1656	4	30	High
<i>Carnobacterium maltaromaticum</i>	1:800				
<i>Lactococcus garvieae</i>	1:800				
<i>Yersinia ruckeri</i>	1:100				

SUMMARY OF TEST RESULTS AGAINST CANINE PATHOGENS

VIRUS TEST PROFILE					
VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
Canine Distemper virus	1:150	EN 14675	10	30	Low

SUMMARY OF TEST RESULTS AGAINST HUMAN PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
<i>Escherichia coli</i> 0157	1:200	EN 1656	10	30	High
<i>Campylobacter jejuni</i>	1:1000				Low
<i>Pseudomonas aeruginosa</i>	1:200				High
<i>Salmonella enteritidis</i>	1:200				Low
<i>Salmonella typhimurium</i>	1:400				High
<i>Shigella sonnei</i>	1:200				Low
<i>Staphylococcus aureus</i>	1:1000				High
<i>Streptococcus pyogenes</i>	1:800				Simulated
<i>Pseudomonas aeruginosa</i>	1:100	EN 16437	10	120	Simulated
<i>Staphylococcus aureus</i>	1:50				

VIRUS TEST PROFILE					
VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
Hepatitis B	1:30	In-house	Room	10	None
Hepatitis C	1:30	In-house	Room	10	None
Human Immunodeficiency type 1 (HIV)	1:60	In-house	Room	10	None

SUMMARY OF TEST RESULTS AGAINST MISCELLANEOUS PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOILING LEVEL
<i>Streptococcus equi</i>	1:200	EN 1656	10	5	Low

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THE EFFECT OF CONTACT TIME AND TEMPERATURE ON BACTERICIDAL ACTIVITY

EN 1656 was carried out with 5 and 30 minute contact times, at a standard 10°C temperature and at 20°C and 30°C to determine the effect on the bactericidal dilution with a range of bacteria.

Tests were repeated with a 1 minute contact time at 30°C against four organisms.

BACTERIA	TEST TEMPERATURE (°C)			
	TIME (MINUTES)	10°C	20°C	30°C
<i>Enterococcus hirae</i>	1	-	-	1:1000
	5	1:1000	1:1000	1:1000
	30	1:1000	1:1000	1:2000
<i>Escherichia coli</i>	5	1:50	1:200	1:400
	30	1:200	1:400	1:400
<i>Proteus hauseri</i>	1	-	-	1:500
	5	Fail 1:250	1:250	1:500
	30	1:250	1:1000	1:1000
<i>Pseudomonas aeruginosa</i>	1	-	-	1:50
	5	Fail 1:10	1:100	1:100
	30	1:50	1:100	1:200
<i>Salmonella enterica</i>	5	1:50	1:200	1:400
	30	1:200	1:400	1:800
<i>Staphylococcus aureus</i>	1	-	-	1:500
	5	1:500	1:1000	1:1000
	30	1:500	1:1000	1:1000

The results indicate that the bactericidal dilution of GPC8 is enhanced by increasing the temperature. This improved activity is greater against some bacteria than against others.

The results also indicate that to obtain the same level of activity with a shorter contact time a higher concentration of GPC8 is required in particular at 10°C and against the Gram negative bacteria *Escherichia coli*, *Proteus hauseri*, *Pseudomonas aeruginosa* and *Salmonella enterica*.

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VETERINARY DISINFECTANT TEST METHODS

Veterinary disinfectants can be used in a variety of areas e.g. the breeding, husbandry, production, transport and disposal of all animals except when in the food chain following death and entry to the processing industry.

There are two types of laboratory test methods for disinfectants i.e. suspension methods and surface methods. Surface methods use different carriers depending on the application area. The inoculum is dried on the surface before testing. As a minimum for general hygiene purposes, products should be effective against bacteria and yeast. There are 3 different claims that can be made when virus tests are used, either for full virucidal activity, limited spectrum virucidal activity or activity against enveloped viruses. It will depend on the viruses tested which claim can be applied.

The scope of veterinary EN test methods does not specify application of the product but does include disinfection by immersion and surface disinfection by wiping, spraying, foaming or other means. It does not include aerial disinfection.

The interfering substances used in EN test methods are described as low or high level soiling for disinfectants and as pre and post milking for teat disinfectants, in veterinary test methods. They simulate levels of soiling encountered in practical, real-life situations.

EN TEST METHODS

TEST REFERENCE		TEST TYPE	ORGANISM	TEST PASS CRITERIA
EN 1656	For bactericidal activity.	Suspension	Bacteria	≥5 log reduction
EN 1657	For fungicidal and/or yeasticidal activity.	Suspension	Fungi/Yeast	≥4 log reduction
EN 14349	For bacterial activity on stainless steel carriers.	Surface	Bacteria	≥4 log reduction
EN 14675	For virucidal activity.	Suspension	Virus	≥4 log reduction
EN 16437	For bacterial activity on wood carriers.	Surface	Bacteria	≥4 log reduction
EN 16438	For fungicidal and/or yeasticidal activity on stainless steel carriers.	Surface	Fungi/Yeast	≥3 log reduction
EN 17122	For virucidal activity on stainless steel carriers.	Surface	Virus	≥3 log reduction

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LOG REDUCTION

Products claiming they will kill 99.9% of bacteria sounds extremely efficient, however it does not prove that a product is an effective disinfectant.

In order to demonstrate effectiveness disinfectants should be tested using European Standard Test Methods. Depending on the applicable area and test used, relevant log reductions are specified and must be achieved to claim effectiveness with a test method. This means a reduction in microbial numbers must be seen when compared to the number of organisms at the start of the test or, for surface tests, to a water control performed at the same time. As the numbers are large it is generally accepted that they are expressed as a logarithm. The reduction can be written as either a log value or a percentage i.e. a 5 log reduction is equivalent to a 99.999% reduction, a 3 log reduction is equivalent to 99.9% reduction.

Bacteria are microscopic free living single celled organisms. A surface contaminated with raw meat for example could have millions of bacteria per square centimetre e.g. a surface with 1,000,000 bacteria treated with a product that kills 99.9% of bacteria would still have 1000 bacteria remaining.

If the surface were treated with a product that kills 99.999% of bacteria only 10 bacteria would remain.

Bacterial growth rates vary depending on the surface, type and degree of soiling, temperature and presence of water. For example, E.coli under ideal conditions multiplies every 15 minutes. If conditions are less than ideal (lowering the temperature or drying the surface) the growth rate slows down.

e.g. 1,000 bacteria would increase to 2,000 after 15 minutes, after 30 minutes it would be 4,000 and after 1 hour 16,000 and 256,000 after 2 hours, **10 bacteria would only have multiplied to 2560 in the same 2 hour period.**

The presence of bacteria does not automatically lead to infection, susceptibility and the infectious dose (number of bacteria required to cause infection) are vitally important. Some bacteria will cause an infection with less than 100 cells ingested or introduced into cuts or wounds. For this reason, it is important to reduce numbers of harmful bacteria to the lowest number possible wherever the risk of infection is high.

THE FOLLOWING FIGURES APPLY IF THE NUMBER AT THE START POINT WAS 1,000,000		
LOG REDUCTION	NUMBER REMAINING	PERCENTAGE REDUCTION
1	100,000	90%
2	10,000	99%
3	1,000	99.9%
4	100	99.99%
5	10	99.999%