



Evans Vanodine International
GLOBAL HYGIENE SOLUTIONS

MICROBIOLOGICAL PROFILE



GPC8™

Glutaraldehyde-based, general-purpose disinfectant

Edition 10: February 2021

Evans Vanodine International plc

GPC 8 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

GPC 8 - 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 and yeast.

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

GPC8 has also been tested against Leptospira, Mycoplasma 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, organisms and diseases they can cause.



Evans Vanodine International plc
GPC 8 MICROBIOLOGICAL PROFILE

SUMMARY OF TEST RESULTS AGAINST AVIAN PATHOGENS

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

VIRUS TEST PROFILE						
VIRUS FAMILY	VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL
Adenoviridae	Avian Adenovirus	1:100	In-house	20	30	Organic
Orthomyxoviridae	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
Coronaviridae	Infectious Bronchitis virus	1:100	In-house	Room Temp	30	None
Birnaviridae	Infectious Bursal disease virus	1:100	In-house	4	30	Organic
Herpesviridae	Infectious Laryngotacheitis virus	1:400	In-house	Room Temp	30	None
	Marek's disease virus	1:200	In-house	10	30	Organic
Paramyxoviridae	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% horse serum

In-house tests use protocols specific for each virus.

Evans Vanodine International plc

GPC 8 MICROBIOLOGICAL PROFILE

SUMMARY OF TEST RESULTS AGAINST BOVINE PATHOGENS

BACTERIAL TEST PROFILE					
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL 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>	1:50				
<i>Staphylococcus aureus</i>	1:500				
<i>Leptospira interrogans</i>	1:200	In-house	Room Temp	2	None
<i>Pseudomonas aeruginosa</i>	1:200	EN 14349	10	30	High
<i>Staphylococcus aureus</i>	1:500				

VIRUS TEST PROFILE						
VIRUS FAMILY	VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL
Flaviviridae	Bovine Viral Diarrhoea virus (BVD)	1:25	EN 14675	10	30	High
Picornaviridae	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 OI British field strain 1860/UK167	1:80	DEFRA	4	30	1% bovine serum

Evans Vanodine International plc
GPC 8 MICROBIOLOGICAL PROFILE

SUMMARY OF TEST RESULTS AGAINST PORCINE PATHOGENS

BACTERIAL TEST PROFILE						
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL	
<i>Enterococcus hirae</i>	1:1000	EN 14349	10	30	High	
<i>Pseudomonas aeruginosa</i>	1:200					
<i>Staphylococcus aureus</i>	1:500					
<i>Mycoplasma hyopneumoniae</i>	1:64000	Minimum inhibitory concentration				
<i>Salmonella enteritidis</i>	1:44	DEFRA	4	30	5% yeast	
<i>Bordetella bronchiseptica</i>	1:200	EN1656	10	30	High	
<i>Enterococcus faecalis</i>	1:800					
<i>Enterococcus hirae</i>	1:1000					
<i>Escherichia coli</i>	1:200					
<i>Pasteurella multocida</i>	1:400					
<i>Pseudomonas aeruginosa</i>	1:50					
<i>Salmonella enteritidis</i>	1:200					
<i>Staphylococcus aureus</i>	1:500					
<i>Streptococcus suis</i>	1:1000					
FIELD ISOLATES						
<i>Actinobacillus pleuropneumoniae (App)</i>	1:100	EN 1656	10	30	High	
<i>Bordetella bronchiseptica</i>	1:100					
<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					

VIRUS TEST PROFILE						
VIRUS FAMILY	VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL
Arteriviridae	PRRS Virus	1:200	In-house	Room Temp	30	None
Asfarviridae	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
Circoviridae	Porcine Circovirus Type 2	1:100*	In-house	10	30	Organic
Coronaviridae	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
Flaviviridae	Classical Swine Fever virus	1:100	In-house	4	30	Organic
Hepadnaviridae	Aujesky's virus	1:250	In-house	4	30	Organic
Orthomyxoviridae	Porcine Influenza A (H1N1)	1:400	EN 14675	10	30	High
Parvoviridae	Parvo virus	1:100	EN 17122	20	120	Low
	Parvo virus	1:200	In-house	Room Temp	30	None
Picornaviridae	Foot and Mouth Disease virus Type A and Type Asia 1	1:200	EN 14675	10	30	Low
	Foot and Mouth Disease Virus 01 British field strain 1860/UK167	1:80	DEFRA	4	30	1% bovine serum
Reoviridae	Porcine Rotavirus	1:200*	In-house	Room Temp	30	None

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

Evans Vanodine International plc

GPC 8 MICROBIOLOGICAL PROFILE

SUMMARY OF TEST RESULTS AGAINST PATHOGENIC FUNGI

FUNGI TEST PROFILE						
DISEASE	FUNGI	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL
Aspergillosis in Poultry	<i>Aspergillus brasiliensis (Formerly niger)</i>	1:50	EN 1657	25	120	Low
Candidiasis	<i>Candida albicans</i>	1:100	EN 1657	10	30	High
Fusarium wilt of bananas (Panama disease)	<i>Fusarium oxysporum f.sp. cubense</i>	1:100	EN 1657	20	30	High

SUMMARY OF TEST RESULTS AGAINST FISH PATHOGENS

BACTERIAL TEST PROFILE						
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL 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 FAMILY	VIRUS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL
Paramyxoviridae	Canine Distemper virus	1:150	EN 14675	10	30	High

SUMMARY OF TEST RESULTS AGAINST HUMAN PATHOGENS

BACTERIAL TEST PROFILE						
ORGANISMS	DILUTION	TEST METHOD	TEMP (°C)	CONTACT TIME (MINUTES)	SOIL LEVEL	
<i>Escherichia coli</i> 0157	1:200	EN 1656	10	30	High	
<i>Campylobacter jejuni</i>	1:1000					
<i>Pseudomonas aeruginosa</i>	1:50					
<i>Salmonella enteritidis</i>	1:200					
<i>Salmonella typhimurium</i>	1:400					
<i>Shigella sonnei</i>	1:200					
<i>Staphylococcus aureus</i>	1:500					
<i>Streptococcus pyogenes</i>	1:800					

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

Evans Vanodine International plc

GPC 8 MICROBIOLOGICAL PROFILE

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	1:25	1:50	1:50
	30	1:100	1:100	1:100
<i>Escherichia coli</i>	5	1:50	1:100	1:100
	30	1:100	1:100	1:100
<i>Proteus vulgaris</i>	1	-	-	1:500
	5	1:200	1:100*	1:200
	30	1:200	1:200	1:200
<i>Pseudomonas aeruginosa</i>	1	-	-	1:50
	5	1:100	1:100	1:100
	30	1:100	1:100	1:100
<i>Salmonella enterica</i>	5	1:100	1:100	1:100
	30	1:200*	1:100	1:100
<i>Staphylococcus aureus</i>	1	-	-	1:500
	5	1:25	1:25	1:25
	30	1:100	1:100	1:100

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. In particular activity is enhanced against *Pseudomonas aeruginosa* the most resistant bacteria to many disinfectants including GPC8.

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 vulgaris*, *Pseudomonas aeruginosa* and *Salmonella enterica*.

Evans Vanodine International plc

GPC 8 MICROBIOLOGICAL PROFILE

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.

As a minimum for general hygiene purposes, products should be effective against bacteria. The scope of EN test methods includes bacterial, fungicidal, virucidal and mycobactericidal test methods. There are claims that can be made when virus tests are used for full virucidal activity, limited spectrum virucidal activity and 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 methods but would include disinfection by immersion and surface disinfection by wiping, spraying, foaming or other means. It does not include aerial disinfection.

All EN methods define test conditions specific for the areas where the disinfectant will be applied.

Contact times in general are 30 or 60 minutes.

The interfering substance used in EN test methods is described as low or high level soiling in veterinary test methods. They stimulate levels of soil encountered in practical, real-life situations.

Generally disinfectant activity improves in warm water, under clean conditions. If the temperature is less than 20°C with dirty conditions a longer contact time may be necessary.

There are two types of laboratory test method for disinfectants i.e. suspension methods and surface methods. They are both quantitative and involve using a test inoculum (mixture of test organism and interfering substance) adding the disinfectant, sampling at specified times, neutralising the sample and then calculating the number of surviving organisms. The log reductions are calculated from either the initial inoculum or a water control.

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	≥4 log reduction
EN 14204	For mycobacterial activity.	Suspension	Mycobacteria	≥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	≥3 log reduction
EN 17122	For virucidal activity on stainless steel carriers.	Surface	Virus	≥3 log reduction

Evans Vanodine International plc

GPC 8 MICROBIOLOGICAL PROFILE

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 was 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. E.coli (under ideal conditions) multiplies in 15 minutes. If conditions are less than ideal e.g. 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 256 in the same 2 hour period.**

The presence of bacteria does not automatically lead to infection, the vulnerability of the person and the infectious dose (number of bacteria required to cause infection) are vitally important. Susceptible individuals such as the very young, elderly and sick are more at risk from an opportunistic infection. 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	100,00	90%
2	10,000	99%
3	1,000	99.9%
4	100	99.99%
5	10	99.999%-