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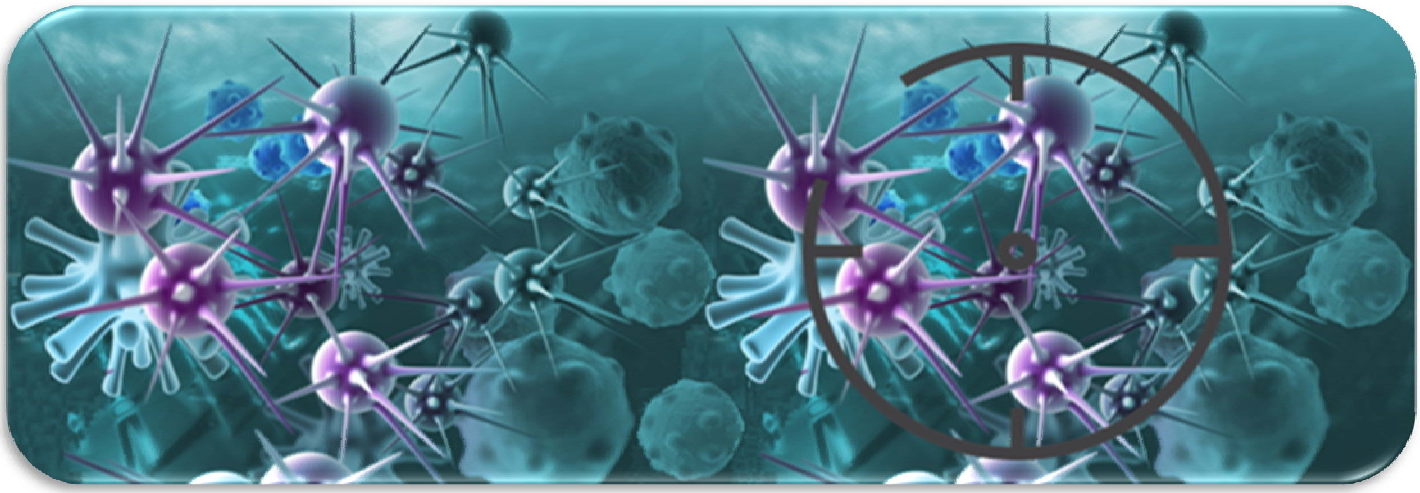
BioGen™



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Typically, when a product or chemical is tested for effectiveness in killing germs, bacteria, virus, etc. the term LOG REDUCTION is used.

Each full log reduction represents a 90% kill rate (x .10) “stacked” on top of each other.

· A log reduction of 1 = 1,000,000 x .10 = 100,000 cells remain (10%). 90% kill rate.

· A log reduction of 2 = 1,000,000 x .10 x.10 = 10,000 cells remain (1%). 99% kill rate.

· A log reduction of 3 = 1,000,000 x .10 x .10 x .10 = 1,000 cells remain (.1%). 99.9% kill rate.

· A log reduction of 4 = 1,000,000 x .10 x .10 x .10 x .10 = 100 cells remain (.01%). 99.99% kill rate.

· A log reduction of 5 = 1,000,000 x .10 x .10 x .10 x .10 x .10 = 10 cells remain (.001%). 99.999% kill rate.

· A log reduction of 6 = 1,000,000 x .10 x .10 x .10 x .10 x .10 x .10 = 1cells remain (.0001%). 99.9999% kill rate.

Howorth BioGen™ Decontamination cycles are validated to a 6 log reduction using Biological Indicators

Table below shows the log reduction of various bacterial pathogens typically found within the healthcare industry. Each bacterium has been fully inactivated.

Name	Log Reduction	Test Condition
Bacillus Atrophaeus	>6.21	Dirty
Escherichia Coli	>5.95	Dirty
Staphylococcus Aureus	>7.48	Clean
Bacillus Stearothermophilus Spores	>6.00	N/A*
Bacillus Subtilis	>5.73	Dirty
Pseudomonas Aeruginosa	>6.83	Clean
Clostridium Difficile spores	>6.36	Dirty
Klebsiella Pneumoniae	>7.87	Dirty
Stenotrophomonas Maltophilia	>6.22	Dirty

Successful Test Key

Dirty = Samples subject to 3.0% soiling agent to demonstrate dirty conditions

Clean = Samples subject to 0.3% soiling agent to demonstrate clean conditions

N/A* = Sample doesn’t require soiling as it is Apex BI

Samples to which are tested under ‘Dirty’ conditions would not be subjected to a full clinical/deep clean as test has proven BioGen™ system will inactivate the bacterium under these conditions – However, It is still recommended a clinical clean is carried out under any circumstances.

All testing was carried out at (PHE) Public health England. 4th December 2014 Project File (109638/31)

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Characteristics of pathogens:

- **Escherichia Coli**

Escherichia coli (E. coli) bacteria normally live in the intestines of healthy people and animals. Most varieties of E. coli cause relatively brief diarrhoea. But particularly nasty strains, such as E. coli O157:H7, can cause severe abdominal cramps, bloody diarrhoea and vomiting.

You may be exposed to E. coli from contaminated water or food — especially raw vegetables and undercooked ground beef. Healthy adults usually recover from infection with E. coli O157:H7 within a week, but young children and older adults have a greater risk of developing a life-threatening form of kidney failure called hemolytic uremic syndrome.

- **Staphylococcus Aureus**

Methicillin-resistant Staphylococcus aureus (MRSA) infection is caused by a type of staph bacteria that's become resistant to many of the antibiotics used to treat ordinary staph infections.

Most MRSA infections occur in people who've been in hospitals or other health care settings, such as nursing homes and dialysis centers. When it occurs in these settings, it's known as health care-associated MRSA (HA-MRSA). HA-MRSA infections typically are associated with invasive procedures or devices, such as surgeries, intravenous tubing or artificial joints.

Another type of MRSA infection has occurred in the wider community — among healthy people. This form, community-associated MRSA (CA-MRSA), often begins as a painful skin boil. It's spread by skin-to-skin contact. At-risk populations include groups such as high school wrestlers, child care workers and people who live in crowded conditions.

- **Bacillus Stearothermophilus Spores**

Geobacillus stearothermophilus (or Bacillus stearophilus) is a rod-shaped, Gram-positive, spore-forming bacterium, that is able to grow either singly or in chains. The cell wall structures of this bacterium are consistent with features found on typical Gram-positive bacterium. That is, they have a thick peptidoglycan layer surrounding their cytoplasmic lipid membrane. However, the G. stearothermophilus Gram stain reaction may vary between positive and negative. This bacterium is also motile, aerobic, and both catalyse and oxidise positive. The colonies of G. stearothermophilus can grow into various shapes and sizes, and in addition, pigments may be formed on certain media.

- **Bacillus Subtilis**

Bacillus subtilis, known also as the hay bacillus or grass bacillus, is a Gram-positive, catalase-positive bacterium, found in soil and the gastrointestinal tract of ruminants and humans

- **Pseudomonas Aeruginosa**

Pseudomonas aeruginosa is a common Gram-negative bacterium that can cause disease in plants and animals, including humans. It is citrate, catalase, and oxidase positive. Serious *Pseudomonas* infections usually occur in people in the hospital and/or with weakened immune systems. Infections of the blood, pneumonia, and infections following surgery can lead to severe illness and death in these people.

However, healthy people can also develop mild illnesses with *Pseudomonas aeruginosa*, especially after exposure to water. Ear infections, especially in children, and more generalized skin rashes may occur after exposure to inadequately chlorinated hot tubs or swimming pools. Eye infections have occasionally been reported in persons using extended-wear contact lenses.

- **Clostridium Difficile Spores**

Spores of the C. difficile bacteria can be passed out of the human body in faeces (stools) and can survive for many weeks, and sometimes months, on objects and surfaces. If you touch a contaminated object or surface and then touch your nose or mouth, you can ingest the bacteria. The C. difficile bacteria do not usually cause any problems in healthy people. However, some antibiotics can interfere with the natural balance of normal bacteria in the gut that protects against C. difficile infection.

A C. difficile infection can also lead to life-threatening complications such as severe swelling of the bowel from a build-up of gas (toxic megacolon).

- **Klebsiella Pneumoniae**

Klebsiella is a type of Gram-negative bacteria that can cause different types of healthcare-associated infections, including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis. Increasingly, Klebsiella bacteria have developed antimicrobial resistance, most recently to the class of antibiotics known as carbapenems. Klebsiella bacteria are normally found in the human intestines (where they do not cause disease). They are also found in human stool (faeces). In healthcare settings, Klebsiella infections commonly occur among sick patients who are receiving treatment for other conditions. Patients whose care requires *devices like ventilators (breathing machines) or intravenous (vein) catheters, and patients who are* ***taking long courses of certain antibiotics are most at risk for Klebsiella infections. Healthy people usually do not get Klebsiella infections***

- ***Stenotrophomonas Maltophilia***

***Stenotrophomonas maltophilia is an aerobic, nonfermentative, gram-negative bacterium. It is a bacterium and human infection is difficult to treat. Usually contracted with direct and indirect contact within the healthcare industry, partic*ularly hospitals.**

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