clinell®
Product Education
Log reduction

What does log reductions stand for?

'Log' reduction is a mathematical term used to express a reduction in microorganisms by a disinfectant. For example, if the base number being used is 10, a 3-log reduction is shown as 10^3 or 10x10x10=1,000. However, log reduction is in the opposite direction, moving down by a factor of 10. So for example, a 4-log reduction of 99.99% is better than a 3-log reduction of 99.9%.

What does log reduction mean?

The most common disinfectant claim relates to kill rates called log reductions. Different products will have different claims on the packaging, like 90% effective and 99.99% effective. In terms of infection prevention and control, log reductions show how effective a product is at reducing the number of microorganisms on a surface. The higher the log reduction, the better it is at killing microorganisms. That's why choosing products with greater efficacy claims is important for the assurance of efficacy and reduction of microorganisms.

Do log reductions matter?

The number of viruses, bacteria and other microorganisms present on a surface can be huge! If there are a million microorganisms on a dirty surface, and the disinfectant being used has a log reduction of 99.9%, then there would still be 1,000 microorganisms left on the surface after disinfection. But a disinfectant with a 99.9999% reduction would only leave 1 microorganism. Using a disinfectant with 3-log reduction will leave fewer microorganisms on a surface compared to a product with a 0-log reduction. In most cases, it is not essential to have zero microorganisms, just to ensure there are not enough viable organisms present to cause infection.

How is log reduction tested?

During product efficacy testing, accredited laboratories count colony forming units (CFU's), where bacteria grow in a group or colony that can be seen with the naked eye, as individual bacteria are far too small to see. They count how many colonies of microorganisms are present at the start of the test. Next, they apply the disinfectant being tested against a control product and wait the required test time before recounting the CFU's.

If the number of CFU's in the control was 1,000,000 (10^6) and the result of the tests was only 1,000 (10^3) CFU's, the log reduction would be 99.9%.

0% 1,000,000	→	90% 100,000	→	99% 10,000	→	99.9% 1,000
	1-log reduction		2-log reduction		3-log reduction	

Examples of log reductions

Log reduction	Number of CFUs remaining	Percentage reduction
0	1,000,000	0%
1	100,000	90%
2	10,000	99%
3	1,000	99.9%
4	100	99.99%
5	10	99.999%
6	1	99.9999%