

HC3 Doorhandles Antibacterial

Additional prevention against bacteria



A hospital infection is an often avoidable and sometimes serious complication of hospitalization or surgery performances in the hospital. When pathogenic bacteria are transmitted to humans in fragile health, they might cause drastic and even life-threatening consequences. Besides discomfort and suffering it can also lead to a longer hospital stay and increased costs.

Handhygiene is considered the most important measure to reduce the risk of transmission of microorganisms on patients. Better compliance with the guidelines for hand hygiene might reduce the number of hospital infections between ten and fifty percent.

Unfortunately, handhygiene awareness in Healthcare is low. In less than twenty percent of the contacts with patients the guidelines are met. The handhygiene of the average professional and visitor in healthcare facilities remains weak. Approximately forty percent washes his hands after using the toilet (Unilever, toilet Glorix Research, 2006).

The Solution, HC3, anti bacterial coating. An additional prevention against bacteria

Door accessories (door handles, handles, pusher plates, etc.) is used extensively in institutions and therefore is a key transfer point for bacteria.

By protecting the Proline door hardware with HC3 coating, this problem can be solved. Products treated with HC3 can be an effective part of a general preventionprogramm against bacterial infection. HC3 has been proven effective against MRSA and E-Coli.

HC3 contains, unlike chemical agents (biocides), an innovative photocatalytic element. This element has the unique property of working as a catalyst under the influence of UV light (daylight or fluorescent light) and uses a physical phenomenon to break down certain organisms (bacteria, viruses, organic debris). The residual, ie water and carbon dioxide are released into the air. Therefore the HC3 coating is not only antibacterial but also self-cleaning (superhydrophilicity).

Another advantage is the durability of the HC3-coating. Because this is a very hard coating it reduces the wear-off to a minimum and the coating will last for years.



Advantages of using HC3 coating in combination with our Proline door hardware

- EN1906 Class 4, vandal-proof and very durable
- solid suspension, allowing the lock spring to be relieved
- High quality stainless steel
- rapid and effective antibacterial
- destroys the remains of the killed bacteria
- self-cleaning (superhydrophilicity)
- invisible
- does not contain outdated technologies like microban or silver ions
- hard and durable
- For more than two years applied in various healthcare institutions worldwide.



Antibacterial generations/



How does HC3 work

UV light activates the HC3 coating, causing electrons in the coating to start doing their work. These electrons come into contact with water molecules (H_2O), which is always present in the atmosphere. This is broken down into two reactive radicals, namely superoxide (O_2^-) and hydroxyl (OH^-).

These free radicals create an oxidizing effect, which degrade organic bodies, such as bacteria and viruses in water (H_2O) and carbon dioxide (CO_2), which in turn is delivered to the atmosphere.

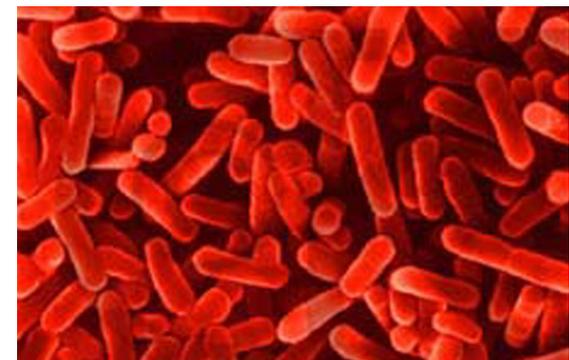
Essential Requirements for the best performance

- availability of UV light
- The light source shall be unfiltered. Eg. Fluorescent lighting may not be shielded.
- Do not clean with very aggressive chemicals

The **first generation** is defined as a number of resources that had a specific antibacterial action, such as copper and silver. Specific bacteria are slain, but the dead bacteria remains on the door fitting and becomes a breeding ground for a new faster growing layer of bacteria. In addition, the use of these materials is very costly and not practical.

Among the **second generation**, we mean biocides such as Microban or Triclosan, and the use of silver ions. Specific bacteria are slain, but the dead bacteria also remains on the door fitting. The doors which have been treated with these agents should therefore be cleaned very regularly, what will decrease the effect of these agents. Also by cleaning with chemical agents (which often happens in carefacilities) the working layer decreases and can eventually be removed completely.

The **third and final generation** is the **HC3 coating** (Coating Hygienic 3rd generation). This is manufactured according to the latest nanotechnologies. It is a very hard and durable coating, which kills and removes various threatening hospital bacteria and viruses. The base of this coating is a special recipe of Titanium Dioxide (TiO_2)





- Main characteristics HC3
- Fast and effective antibacterial action
 - Destroys the remains of the killed bacteria
 - Self-cleaning (Superhydrophilicity)
 - Invisible
 - Does not contain Microban or silver ions (obsolete technology)
 - Hard and durable

Workgroup Infectionprevention 12-2010 (NL)

Measurements/

Hospitals are increasingly faced with resistant microorganisms. The best known so far is the methicillin-resistant *Staphylococcus aureus* (MRSA). However, there are more microorganisms which are able to develop resistance against an antibiotic or combination of antibiotics, in this particular directive further referred to as-resistant micro-organisms (BRMO). Because treatment of infections with these resistant micro-organisms is less possible, it is of paramount importance within a hospital to take measures aimed at:

- the prevention of resistance development
- preventing the spread of BRMO.

The prevention of resistance development is pursued through the use of a rational, cautious antibiotic policy. In the Netherlands, the Foundation Working Party on Antibiotic Policy (SWAB) is working on this. This Directive lays down the minimum necessary measures to reduce transfer of BRMO. This Directive shall not apply to MRSA and multidrug-resistant *Mycobacterium tuberculosis*. Please refer to the relevant WIP guidelines and general MRSA Prevention of infection with tuberculosis in hospitals. Dissemination of BRMO is prevented by the same measures to prevent dissemination of sensitive bacteria, as expressed inter alia in General

precautions and isolation policies (WIP). There are a number of reasons for special attention to BRMO. The consequences of the spread of BRMO are more serious than normal bacteria. For the occasional patient this may mean that he should be treated with a more toxic or less effective antibiotic. Else there is only the possibility of intravenous antibiotic. For the hospital the result is that the antibiotic policy should be adapted and more expensive antibiotics should be prescribed.



Methicilline Resistente Staphylococcus Aureus

MRSA/

MRSA (methicilline Resistente Staphylococcus Aureus)

MRSA is a staphylococcus which has changed something in its genetic material (Mec a-gen) so the bacterium has become resistant to the antibiotic methicillin. The MRSA bacteria lives with appr. 30% of the people on the skin and in mucous membranes. In everyday life, the bacteria is harmless. Only at reduced resistance, skin injuries and wounds it can cause infections. With "normal" Staphylococcus aureus it can be treated with standard antibiotics.

This is not the case with MRSA. All over the world is spoken about MRSA, as the cause of nosocomial infections.

MRSA bacteria transfers through carriers - people who have the bacteria on their skin or up the nose. without any adverse effects for the individual - and is obviously spread by patients. The carrier itself can become a patient when the MRSA bacterium, which he carries, transfers into the bloodstream or through a woundinfection. A carrier, nurse or carer for example can contaminate directly or indirectly through instruments that will be used for research. The infection is often brought in from abroad, due to a less strict antibiotic policy in some countries. People directly from abroad and as a patient in an intensive care unit or in a surgical ward should be first precautionary nursed in isolation. Bacteriological examination can reveal whether the dreaded MRSA is possibly present.

By a simple bacteriological examination of a skin or nasal swab is to determine whether a drug-resistant Staphylococcus is present. The patient in whom MRSA is present, immediately is transferred to a closed ward, and all people who have been in contact with the patient are examined to see if they may be contaminated also with the bacteria, making them unwillingly as carrier for further dissemination.

Any carriers among the hospital staff are none-active to keep them away from patients or wards. These persons are then regularly examined bacteriologically, which in the majority of cases after some time the signal will turn green again, because the colonizing bacteria usually will disappear. Occasionally, however, appear carriers permanent scatterers, in fact, they are - how hard it may seem, unsuitable for many functions within healthcare.

Furthermore, very often is decided to lock down the department where the MRSA infected patient stayed. The department has to be thoroughly cleaned and sterilized. To ban out methicillin-resistant staphylococcus is impossible, because of the worldwide spread.

Recently, it has been shown that this hospital bacterium occurs on a large scale in the piggyard and is transmitted to humans. Very recently, the bacteria also occurred in horses. Even here good hospital hygiene is of great importance to prevent infections with these bacteria. When the source for these bacteria is found thoroughly cleaning is necessary.

Infections with MRSA are hard to fight, but bacterium can be susceptible to a number of means, such as:

- vancomycin i.v.
- Rifampicin oral
- Bactrimel oral
- Ciprofloxacin oral
- Fusidic acid orally and locally
- Mupirocin (Bactroban) locally

Resistance to these antibiotics can also easily arise, therefore, prevention is better than cure.

How does an infection arise

Staphylococci present in the nose can infect the skin, where there is a local reduced resistance caused by eg an insect bite or eczema. On a healthy skin staphylococci are not usually found.



Stafylococcen / E-Coli



Stafylococci-infections

These are superficial infections of the skin by local resistance-decrease and can be MRSA. Forty percent of healthy people has staphylococci in the nose, with approximately twenty percent being a permanent bearer and ten percent a rarely-bearer. Staphylococci are picked up by eg infected wounds and boils. Annually about 2000 infections take place, 75% in hospitals, 15% in nursing homes and 10% at the MD or at home.

Riskgroups

- patients who have recently been treated in a foreign hospital
- patients in nursing homes or a hospital where an MRSA epidemic has prevailed.
- patients with skin and soft tissue infections (abscesses, cellulitis), which aggressively spread.
- children with staphylococci pneumonia
- persons who have direct contact with live pigs and / or veal
- au-pair girls from the Philippines

MRSA cultures need to be conducted before referral to a hospital with the above risk groups which exhibit characteristics of specified infections and / or do not respond to the usual antibiotics. The MRSA culture applications have increased alarmingly in recent years. From 179 in 2004 to 442 applications in 2008 (in the Netherlands)

E-Coli (Escherichia Coli)

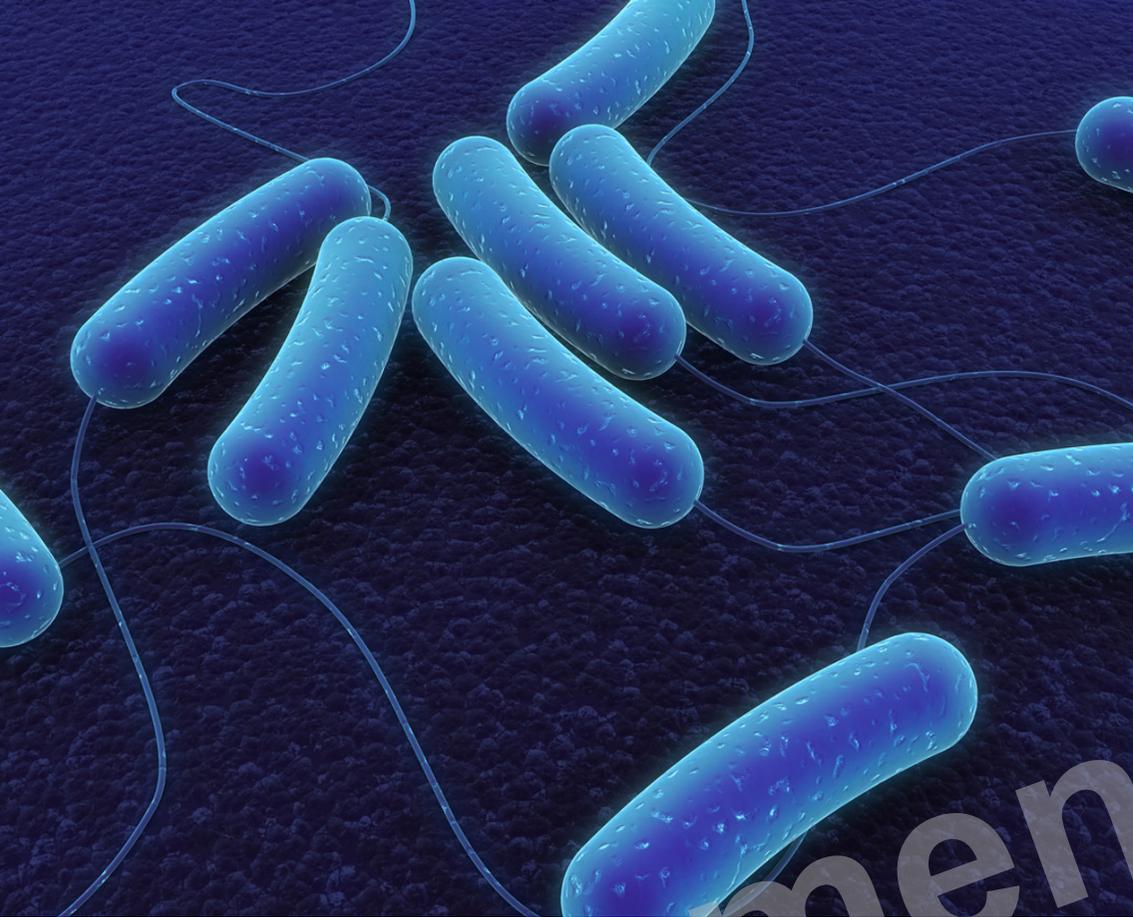
Escherichia coli is a gram-negative rod-shaped bacterium and is a bacterium, which in the human body is the most prominent. E-Coli is in our colon, where it is committed to the digestion of our food. These bacteria are excreted by us together with our faeces (approximately 100 to 10000 billion per day). Besides digestion E-coli is the cause for production of vitamin K, a substance in the produced in the liver which allows for blood clotting. In addition, it also provides the logistics of calcium in our body and it ensures that calcium gets in the right places. When using large quantities of antibiotics, this bacterium is thinned, what causes lack of vitamin K. Nosebleeds and even internal intestinal bleeding can be the result.

E-Coli also has its bad sides.

With the case of a perforation of the intestine, it is possible that the abdominal cavity is contaminated among others with E-coli. The resulting peritonitis is life threatening and should be treated urgently.

When the urethra is infected with E-coli, a bladder infection may occur.





EHEC (Enterohemorrhagische Escherichia coli)

EHEC is a collective name for various strains of E. coli, which produce verotoxin. These strains are responsible for many cases of food poisoning and can cause serious complications. The word 'enterohemorrhagisch' indicates that these bacteria can cause serious infections with bloody diarrhea. A known variant is the EHEC O157: H7. In 2011 came the news of an EHEC outbreak by an apparently rare and aggressive variant EHEC, O104: H4. Escherichia coli O104: H4 is a very rare gram-negative bacteria. This variant appears next to having a fixed resistance to some antibiotics also to have a more negative prognosis as current EHEC strains. A much higher percentage of patients develop severe kidney problems.

ESBL (Extended Spectrum Beta Lactamase)

ESBLs are cephalosporinases that destroy (cut open) the antibiotic cephalosporin and is found only in gram-negative bacteria. Such as E-coli and Klebsiella (UTIs)

Treatment of ESBLs is only possible with other antibiotics, such as nitrofurantoin, trimethoprim, or bactrimel ciproflaxine Also with ESBLs So prevention is better than cure.

ESBL's arise as follows:

- The bacteria in the gut is spontaneously resistant by intensive use of cephalosporins
- Transfer of patient to patient via the hands of employees (colonization)

And can be prevented by:

- measures to prevent resistance development by a conservative antibiotic policies (Working Party on Antibiotic Policy Foundation; SWAB)
- preventing the spread of resistant micro-organisms through contact isolation / barrier.

ESBL in the community in recent years has increased by leaps and bounces. Of about ten in 2006 to hundreds forty-eight in 2008.

Each E. coli or Klebsiella is standard tested in the laboratories for the presence of ESBLs, with most of the cultures resulting from urinary tract infections.

Measures to prevent transmission

- ESBL transmission is through the hands
- BRMO goes through the hands
- MRSA is through air and hands

A very good measure therefore is to provide contactproducts, such as door fittings, with the HC3 coating. It fights bacteria, destroys and removes them.

The bacteria that are capable of producing ESBL (Klebsiella, Escherichia coli), are Gram-negative bacteria make a so-called endotoxin. They are harmless as long as they are in the intestine of healthy individuals. But they can cause severe infections in very young and also old people with impaired immune systems.

VRE / Clostridium



VRE

VRE stands for Vancomycin Resistant Enterococcus faecium and is an intestinal bacterium that occurs in many people.

The difference between the ordinary and the VRE bacterium is that the AER has become insensitive to vancomycin. Like most bacteria, the VRE bacteria in particular spreads through the hands. Only for people with a greatly reduced resistance VRE can lead to an infection.

Clostridium difficile

This bacterium is the cause of Clostridium difficile associated diarrhea (CDAD) ie diarrhea. This bacterium is common. The bacterium is in the intestine causes no damage. Only when the wearer uses certain antibiotics, and the resistance is severely reduced, by a serious illness, these bacteria will grow and produces toxins. This may cause illness.

Door hardware with the anti-bacteria HC3 Coating

The Solution/

The solution

Architectural hardware with anti-bacterial Coating HC3. HC3 is available on our entire collection. Architectural hardware Project is approved for the highest user class 4 according to the EN1906. Are tested by independent institutes according the European Norm EN1906. Architectural hardware comes with a ten years warranty.

What does the the norm EN1906 mean exactly?

During the opening and closing of doors, door handles undergo horizontal, vertical and rotational forces, which must be accommodated by the restraint on rosette or shield.

The following points are important:

- Operation Moments
- Permissible clearance and safety
- Free rotation angle and alignment tolerance
- Sustainability

User Class 4 = high frequency, very intensive use on doors in projects with frequent violent abuse or even intentional abuse. (eg soccer stadiums, oil drilling platforms, barracks, public toilets, etc.)

The program lines Proline and Proline Proline Slimface are tested and certified to class 4. These lines are also tested and certified to EN1634-2 fire tests and are available as DIN18273 fire rated.

Proline is available in various models, both on rosette and short- or longplate. Our entire collection of anti-suicidal door fittings and pull-handles is also available with our antibacterial coating HC3.

