# NEUTRAFECT

# FORMULATION HWS-64

## Description

Formulation **HWS-64** is a broad spectrum, neutral pH, hard surface disinfectant. When used as directed, this product will deliver effective biocidal action against bacteria, fungi, and viruses. Biocidal performance is attained when this product is properly diluted at 2 oz. per gallon or 1:64. Formulation **HWS-64** can be used to disinfect a wide variety of hard surfaces such as floors, walls, and countertops in hospitals, households, and institutions.

## Formula:

| | Formulation HWS-64 %wt/wt |
|---|---|
| **Active Ingredient** | |
| FMB® 1210-8 (80% active) | 5.3 |
| **Inert Ingredients**[1, 2] | |
| Ethylenediamine tetraacetic acid | 0.2 |
| Tetrasodium ethylenediamine Tetraacetate 38% | 1.4 |
| FMB® AO-8 | 5.25 |
| Dye | 0.00 to 0.10 |
| Fragrance | 0.00 to 1.00 |
| Water | q.s. to 100.00 |

**Regulatory Summary**

| | |
|---|---|
| **EPA Registration No.** | **47371-131** |
| **USDA Authorization** | **A4,C1, D1** |
| **California Status** | **Registered** |
| **Canadian PCP#** | **24879** |
| **Canadian Din #** | **01944045** |

**Physical Properties**

| | | | |
|---|---|---|---|
| pH of Concentrate | 7.2-8.2 | Flash Point (PMCC) | >200°F |
| Specific Gravity @ 25°C | 0.99 | % Quat (mol. wt.360.5) | 4.02-4.44 |
| Pounds per gallon @ 25°C | 8.34 | % Volatile | 93.5 - 94.5 |

[1] See approved list of suppliers

[2] See Confidential Statement of Formulation for exact ingredients and amounts. If you have any questions please call Lonza Tech Service at 800-365-8324 or contact.allendale@lonza.com





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## Summary of Antimicrobial Test Results

Formulation **HWS-64** is a "One-Step" Hospital Disinfectant, Virucide, Fungicide, Mildewstat, and Cleaner. Listed below, and in the following pages, is a summary of the Antimicrobial Claims and a review of the Antimicrobial Test Results.

| **Claim:** | **Contact Time:** | **Organic Soil:** | **Water Conditions:** |
|---|---|---|---|
| Disinfectant | 10 minutes | 5% | 400 ppm as $CaCO_3$ |
| **Test Method:** | Official Method of the AOAC, 14 Edition Use Dilution Method | | |

| **Organism** | **ATCC#** | **Use-Dilution Concentration** | **Hard Water Condition** | **Replicates** | **Results** |
|---|---|---|---|---|---|
| Acinetobacter calcoaceticus | 23055 | 660 ppm (2 oz/gal) | 400 ppm | 10, 10 | 0/10, 0/10 |
| Bordetella bronchiseptica | 31427 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Chlamydia psittaci | VR-854 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Enterobacter aerogenes | 13048 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Enterobacter cloacae | 23355 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Enterococcus (Streptococcus) faecalis (Vancomycin Resistant) | 51299 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Escherichia coli | 11229 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Escherichia coli[1] (Clinical Isolate) | (Clinical Isolate) | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Fusobacterium necrophorum | 27852 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Klebsiella pneumoniae[2] | 13883 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Legionella pneumophila | 33153 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Listeria monocytogenes | 15313 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Pasteurella multocida | 7707 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Proteus mirabilis | 25933 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Proteus vulgaris | 13315 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Pseudomonas aeruginosa | 15442 | 660 ppm | 400 ppm | 60, 60, 60 | 0/60, 0/60, 0/60 |
| Pseudomonas aeruginosa[3] | Clinical Isolate | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Salmonella choleraesuis | 10708 | 660 ppm | 400 ppm | 60, 60, 60 | 0/60, 0/60, 0/60 |
| Salmonella enteritidis | 13076 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Salmonella Typhi | 6539 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Salmonella Typhimurium | 14028 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Serratia marcescens | 8100 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Shigella Flexneri | 12022 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Shigella Sonnei | 9290 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |

1 Resistant to the Antibiotics: Ampicillin, Carbenicillin, Kanamycin, and Tetracycline.

2 Resistant to the Antibiotics: Ampicillin, Carbenicillin, Chloramphenicol, and Tetracycline.

3 Resistant to the Antibiotics: Amikacin, Ampicillin, Carbenicillin, Cefamandole, Cefazolin,Cefoxitin, Chloramphenicol, Kanamycin, and Tetracycline.



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| Organism | ATCC# | Use-Dilution Concentration | Hard Water Condition | Replicates | Results |
|---|---|---|---|---|---|
| Staphylococcus aureus | 6538 | 660 ppm | 400 ppm | 60, 60, 60 | 0/60, 0/60, 0/60 |
| Staphylococcus aureus (MRSA)[7] | 33592 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Staphylococcus aureus[4] (VISA) | CDC No. HIP-5836 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Staphylococcus epidermidis[5] | Clinical Isolate | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Streptococcus (Enterococcus) faecalis | 19433 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Streptococcus (Enterococcus) faecalis[6] | 19433 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |
| Streptococcus pyogenes | 19615 | 660 ppm | 400 ppm | 10, 10 | 0/10, 0/10 |

**Conclusion:** All lots of Formulation **HWS-64** effectively killed the above listed bacteria as specified in the test performance standards. Formulation **HWS-64** meets EPA requirements for hard surface disinfectant claims in hospital and medical environments when diluted as directed.

| Claim: | Contact Time: | Organic Soil: | Water Conditions: |
|---|---|---|---|
| Mildewstat | 10 minutes | 5% | 400 ppm as $CaCO_3$ |
| **Test Method:** | Mildewstat (Mold and Mildew Control) - EPA - TSD 6-201 Mildewstat on Hard Surfaces | | |

| Organism | ATCC# | Use-Dilution Concentration | Hard Water Condition | Replicates | Results |
|---|---|---|---|---|---|
| Aspergillus niger | 6275 | 660 ppm (2.0 oz/gal) | 400 ppm | 10, 10 | 0/10, 0/10 |

**Conclusion:** All lots of Formulation **HWS-64** were effective against Aspergillus niger under the test conditions outlined in the EPA test performance standards described above.

| Claim: | Contact Time: | Organic Soil: | Water Conditions: |
|---|---|---|---|
| Fungicide | 10 minutes | 5% | 400 ppm as $CaCO_3$ |
| **Test Method:** | Official Method of Analysis of the AOAC Fungicidal Test. | | |

| Organism | ATCC# | Dilution | Replicates | Results | | | |
|---|---|---|---|---|---|---|---|
| | | | | | 5 Min | 10 Min | 15 Min |
| Candida albicans | 11651 | 660 ppm (2 oz/gal) | 4 | 0/4 | + | 0 | 0 |
| Trichophyton mentagrophytes | 9533 | 660 ppm (2 oz/gal) | 4 | 0/4 | + | 0 | 0 |

4 Reduced Susceptibility to Vancomycin

5 Resistant to the Antibiotics: Cefazolin, Chloramphenicol, Clindamycin, Erythomycin, Gentamicin, Kanamycin, Methicillin, Penicillin, Tetracycline and Tobramycin

6 Resistant to the Antibiotics: Cefazolin, Chloramphenicol, Clindamycin, Erythomycin, Gentamicin, Kanamycin, Methicillin, Penicillin, Tetracycline and Tobramycin

7 Resistant to Methicillin



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**Conclusion:** All lots of Formulation **HWS-64** effectively killed Trichophyton mentagrophytes and Candida albicans as specified in the test performance standards.

| **Claim:** | **Contact Time:** | **Organic Soil:** | **Water Conditions:** |
|---|---|---|---|
| Virucide | Varies | 5% | 400 ppm as $CaCO_3$ |
| **Test Method:** | EPA Guidelines | | |

| **Organism** | **Source of Virus or ATCC#** | **Host System; Cytopathic Effect** | **Use-Dilution Concentration** | **Contact Time** | **Reduction (Log 10) of Virus Titer** |
|---|---|---|---|---|---|
| Adenovirus Type 4 | ATCC VR-4 strain RI-67 | H. Ep. #2 cells Cytopathic Effects | 660 ppm (2.0 oz/gal) | 10 Min. | 5.5, 5.5 |
| Adenovirus Type 7 | ATCC VR-7 | HeLa cells ATCC CEL-1958 | 2644 ppm (8 oz/gal) | 10 Min. | >3.5, >3.5 |
| Hepatitis B Virus (HBV) | Hepadna Virus, Inc. (DHBV) | Primary Duck Hepaocytes; No Cytopathic Effects | 660 ppm | 10 Min. | 4.8, 4.8 |
| Hepatitis C Virus (HCV) | Bovine Viral Diarrhea Virus | MDBK Cells | 660 ppm | 10 Min. | 5.5, 5.7 |
| Herpes Simplex Type 1 | HSV-1; ATCC VR-733 | VERO cells; lytic cytopathic effect | 660 ppm | 10 Min. | >7.5, 7.5 |
| Herpes Simplex Type 2 | HSV-2; MS Strain | VERO cells; lytic cytopathic effect | 660 ppm | 10 Min. | >6.5,6.5 |
| HIV-1 (AIDS Virus) | $HTLV\text{-}III_{RF}$; NCI | MT2 cells; lytic cytopathic effect | 660 ppm | 4 Min. | >3.0, 3.0 |
| Human Corona Virus | VR-740 Strain 229E | MRC-5 Host | 660 ppm | 10 Min | >4.0, >4.0 |
| Influenza A/ Hong Kong | ATCC 68-H3N2 | MDCK cells; lytic cytopathic effect | 660 ppm | 10 Min. | >8..0, 8.0 |
| Rubella virus | Strain M-33 | RK13 cells; cytopathic effect | 660 ppm | 10 Min. | >5.0, 5.0 |
| Rabies virus | ATCC VR-138 | | 660 ppm | 10 Min. | 4.5, 4.5 |
| Respiratory Syncytial virus | ATCC VR-26 | | 660 ppm | 10 Min. | 4.0, 4.5 |
| SARS associated Coronavirus | Vero E6 coronavirus | Vero E6 Cells | 660 ppm | 10 Min | 3.5, 3.5, 3.5 |
| Vaccinia | Strian IHD | VERO Cells; lytic cytopathic effect | 660 ppm | 10 Min. | >7..0, 7.0 |
| Avian Infectious Bronchitis virus | ATCC VR-22 | | 660 ppm | 10 Min. | 6.0, 6.25 |
| Avian Polyomavirus | lab isolate | | 660 ppm | 10 Min | 4.0, 6.0 |
| Canine Distemper virus | ATCC-VR-256 | | 660 ppm | 10 Min. | 3.5, 3.5 |
| Feline Leukemia Virus | ATCC VR-717 Strain FL-237 | | 660 ppm | 10 Min. | 4.5, 4.75 |
| Feline Picornavirus | ATCC VR-649 | | 660 ppm | 10 Min. | 5.0, 5.0 |



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| | | | | | |
|---|---|---|---|---|---|
| Infectious Bovine Rhinotracheitis | ATCC VR-793 | | 660 ppm | 10 Min. | 8.0,8.0 |
| Newcastle Disease Virus | ATCCC VR-108 Strain B1 Hitchner or Blacksburg | Chicken embroyo fibrorblast cells | 660 ppm | 10 Min. | ≥4.0, ≥4.0 |
| Pseudorabies Virus | ATCC VR-135 | | 660 ppm | 10 Min. | 5.5, 5.5 |
| Transmissible Gastroenteritis | ATCC VR-763 | | 660 ppm | 10 Min. | 3.5, 3.5 |

**Conclusion:** All lots of Formulation **HWS-64** effectively inactivated the above listed viruses as specified in the test performance standards. Formulation **HWS-64** meets EPA requirements for hard surface virucidal claims in hospital and medical environments.

## Summary of Antimicrobial Efficacy – Etiology[8]

| Pathogenic Microorganism | Description |
|---|---|
| Acinetobacter calcoaceticus | Gram negative (spherical shape) bacteria. Occurs in soil, water and sewage. A nosocomial infection can cause septicemia, meningitis and urinary tract infections. |
| Adenovirus Type 4 | Lipophilic (enveloped) DNA virus, (one of several) causative agent for colds and other respiratory ailments. |
| Aspergillus niger | Black mold, found in shower and dressing rooms. Environmental contaminant may also cause “Aspergillosis.” |
| Bordetella bronchiseptica | Gram negative (spherical shape) bacteria. Causative agent for “puppy cough” in dogs. Bordetella pertusis is the causative agent for whooping cough in children. |
| Candida albicans | Fungi, yeast. This organism exhibits dimorphism; exists both as fungi and yeast. Causes skin rashes. Common cause for diaper rash. Can infect both oral and vaginal cavities. Causes itching and discomfort. |
| Canine Distemper | Lipophilic (enveloped) RNA virus. Highly contagious among dogs causes fever, gastrointestinal and respiratory symptoms. |
| Chlamydia psittaci | Once believed to be a large virus but later found to be a parasitic bacterium. Infections cause fever, malaise and hacking cough. Most infections are occupational; poultry workers and other keepers of birds. |
| Enterobacter aerogenes | Gram negative bacteria spread by anal/oral route of infection. Associated with bacteremia, respiratory, wound and urinary tract infections. |
| Enterobacter cloacae | Gram negative bacteria spread by anal/oral route of infection. Associated with bacteremia, respiratory, wound and urinary tract infections. |
| Escherichia coli | Gram negative bacteria spread by anal/oral route of infection, resulting in diarrhea outbreaks. Associated with urinary tract infections and bacteremia. |
| Feline Leukemia Virus | Enveloped RNA virus. One of the causative agents of lyphosarcoma in cats. |
| Fusobacterium necrophorum | Gram negative (rod shape) bacteria. Causative agent of “hoof rot” in sheep, cattle and horses. |
| HBV (Hepatitis B virus) | Lipophilic (enveloped) DNA virus of the Hepadnaviridae family. Causative agent of Hepatitis B (serum hepatitis). |
| HCV (Hepatitus C Virus) | Major cause of acute hepatitis and chronic liver disease, including cirrhosis and liver cancer. It is an enveloped RNA virus in the flavivirdae family. |



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| | |
|---|---|
| Herpes Simplex Type 1&2 | Lipophilic (enveloped) DNA virus may result in oral mucocutaneous lesions. Associated with most orofacial herpes and HSV encephalitis. |
| HIV-1 (AIDS Virus) | Lipophilic (enveloped) RNA retrovirus. Human Immunodeficiency Virus. Known to be the etiologic agent of Acquired Immunodeficiency Syndrome (AIDS). |
| Human Corona Virus | Single Strand RNA containing virus causing respiratory infection in humans. From order Nidovirales and Family Coronaviridae. |
| Influenza A/Hong Kong | Lipophilic (enveloped) RNA virus. Causative agent in viral flu. Causes flu epidemics in nearly 2 of every 3 years. |
| Klebsiella pneumoniae | Gram negative bacteria associated with severe pneumonia, bacteremia and urinary tract infections. |
| Legionella pneumophila | Gram negative (rod shape) bacteria. Causative agent for "legionnaire disease." First documented outbreak occurred in 1976 at Philadelphia American Legion convention. |
| Listeria monocytogenes | Gram positive (rod shape) bacteria. Considered a potent food pathogen. Found in raw meat and poultry. Infections can result in meningitis or sepsis. |
| Newcastle Disease Virus | NDV is a contagious and fatal viral disease affecting most species of birds. A death rate of almost 100 percent can occur in unvaccinated poultry flocks. NDV can infect and cause death even in vaccinated poultry. |

| | |
|---|---|
| Pasteurella multocida | Gram negative (spherical shape) bacteria. Human infections are a result of an animal bite. Indigenous flora of many animals respiratory tracts. |
| Proteus mirabilis | Gram negative (rod shape) bacteria. Highly motile bacteria. Opportunistic pathogen causes bacteremia, urinary tract infections, especially with the chronically ill. |
| Proteus vulgaris | Gram negative (rod shape) bacteria. Highly motile bacteria. Opportunistic pathogen causes bacteremia, urinary tract infections, especially with the chronically ill. |
| Pseudomonas aeruginosa | Gram negative bacteria identified as a major cause of hospital acquired (nosocomial) infections. Causes wound infections (especially burn), meningitis, pneumonia and eye infections. Required for Hospital Disinfectants. |
| Rabies | A member of the Rhabdoviridae family or RNA viruses. These bullet shaped viruses are enveloped by a lipid bilayer. The causative agent for "rabies", an encephalitis that causes neuronal degeneration-- almost always fatal. |
| Respiratory Syncytial Virus | A paramyxovirus type virus, lipophilic (enveloped). A causative agent of pneumonia and bronchiolitis in small children and infants. Highly contagious, transmitted by person-to-person contact. |
| Rubella | Lipophilic (enveloped) RNA togavirus. The causative agent of German measles. |
| Salmonella choleraesuis | Gram negative bacteria associated with acute gastroenteritis and septicemia. Required for Hospital Disinfectants. |
| Salmonella enteritidis | Gram negative (rod shape) bacteria associated with acute gastroenteritis and diarrhea. |
| Salmonella schottmuelleri | Gram negative (rod shape) bacteria associated with acute gastroenteritis and diarrhea. |
| Salmonella typhi | Gram negative (rod shape) bacteria associated with acute gastroenteritis and diarrhea, the causative agent for typhoid fever. |
| Salmonella typhimurium | Gram negative (rod shape) bacteria associated with acute gastroenteritis and diarrhea. |
| Serratia marcescens | Gram negative bacteria associated with urinary tract infections, meningitis and septicemia . |



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| | |
|---|---|
| Shigella dysenteriae | Gram negative bacteria directly spread by anal/oral route of infection; indirectly (including food, hands, flies) spread by contaminated food and inanimate objects resulting in bacillary dysentery. |
| Shigella flexneri | Gram negative bacteria directly spread by anal/oral route of infection; indirectly (including food, hands, flies) spread by contaminated food and inanimate objects resulting in bacillary dysentery. |
| Shigella sonnei | Gram negative bacteria directly spread by anal/oral route of infection; indirectly (including food, hands, flies) spread by contaminated food and inanimate objects resulting in bacillary dysentery. |
| Staphylococcus aureus | Gram positive bacteria identified as a major cause of hospital acquired (nosocomial) infections. Colonizes food and secretes enterotoxins which cause food poisoning after ingestion. Causes wound infections, septicemia, endocarditis, meningitis, osteomylitis and pneumonia. Required for Hospital Disinfectants. |
| Streptococcus (Enterococcus) faecalis | Gram positive (Enterococci) bacteria causing hemolysis, urinary tract infections and endocarditis. |
| Trichophyton mentagrophytes | Athlete's foot fungus. Found in shower and dressing rooms. |
| Vaccinia | Lipophilic (enveloped) DNA poxvirus; causes poxvirus infections. |

8 Microbiology, D. Kingsbury and G. Wagner Harwal Publishing 1990

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Supercedes: 5-5-07



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