Bringing nature’s balance indoors

nanoe™ X, technology with the benefits of hydroxyl radicals
In today’s health-conscious world, we care about taking exercise, we care about what we eat and what we touch, we also care about what we breathe – and technology exists to bring good outdoor air, indoors.

The nanoe™ X performance varies depending on the room size, environment and usage and it may take several hours to reach the full effect (see test result table for more detail in page 4). nanoe™ X is not a medical device, local regulations on building design and sanitary recommendations must be followed.

Bringing nature’s balance indoors

The well-being benefits of nature are well known – but do you know the power of hydroxyl radicals?

Abundant in nature, hydroxyl radicals (also known as OH radicals) have the capacity to inhibit pollutants, viruses, and bacteria to clean and deodorise. nanoe™ X technology can bring these incredible benefits indoors so that hard surfaces, soft furnishings, and the indoor environment can be a cleaner and pleasant place to be, whether at home, at work, or visiting hotels, shops, restaurants etc.

WE BREATHE IN
18Kg
OF AIR A PERSON A DAY

WATER
1.2Kg
A PERSON A DAY

FOOD
1.3Kg
A PERSON A DAY
A naturally occurring process

Hydroxyl radicals are unstable molecules looking to react with other elements like hydrogen, capturing it. Thanks to this reaction, hydroxyl radicals have the potential to inhibit the growth of pollutants such as bacteria, viruses, moulds, and odours, breaking them down and neutralising the unpleasant effects. This naturally occurring process has major benefits to improve indoor environments.

Panasonic’s nanoe™ X technology takes this a step further and brings nature’s detergent – hydroxyl radicals – indoors to help create an ideal environment.

By creating hydroxyl radicals contained in water, nanoe™ X technology significantly boosts their effectiveness, increasing hydroxyl radicals lifetime from less than a second in nature, to more than 600 seconds – 10 minutes so that nanoe™ X can spread easily around the room.

Thanks to the nanoe™ X properties, several types of pollutants can be inhibited such as certain types of bacteria, viruses, mould, allergens, pollen and certain hazardous substances.

| 1 | nanoe™ X reliably reaches pollutants. |
| 2 | Hydroxyl radicals denature pollutants’ proteins. |
| 3 | Pollutants activity is inhibited. |

Lifespan of hydroxyl radicals contained in water is around 10 minutes, during this time they have the capacity to act against the pollutants. It may require longer to inhibit pollutants effectively, see the tests on effectiveness on nanoe™ X on airborne and adhesive pollutants.
What is unique about nanoe™ X?

Hydroxyl radicals inhibit pollutants, certain types of viruses, and bacteria to clean and deodorise. Thanks to this advanced technology, even tightly woven fabrics can be treated using this solution, meaning that curtains, blinds, carpets and furniture can all benefit from this technology to inhibit hazardous substances – including on hard surfaces and, of course, the air that we breathe.

1. At one billionth of a metre, nanoe™ X is much smaller than steam and can deeply penetrate cloth fabrics to deodorise.

2. Contained in tiny water particles, nanoe™ X has a longer lifespan to spread easily around the room.

3. nanoe X Generator Mark 2 produces 9.6 trillion hydroxyl radicals per second. Greater amounts of hydroxyl radicals contained in nanoe™ X lead to higher performance on inhibition of pollutants.

4. No maintenance, no replacement required. nanoe™ X is a filter free solution that does not require maintenance, as its atomisation electrode is enveloped with water during its generation process and it is made with Titanium.

* Refer to https://aircon.panasonic.eu for more details and validation data.
nanoe™ X, internationally-validated technology in testing facilities

The effectiveness of nanoe™ X technology has been tested by 3rd party laboratories in Germany, France, Denmark, Malaysia and Japan.

The effectiveness of nanoe™ X

<table>
<thead>
<tr>
<th>Tested contents</th>
<th>Result</th>
<th>Capacity</th>
<th>Time</th>
<th>Testing organisation</th>
<th>Report No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virus</td>
<td>Bacteriophage ΦX174</td>
<td>99.7% inhibited</td>
<td>Approx. 25 m³</td>
<td>6 h</td>
<td>Kitasato Research Center for Environmental Science</td>
</tr>
<tr>
<td>Bacteria</td>
<td>Staphylococcus aureus</td>
<td>99.9% inhibited</td>
<td>Approx. 25 m³</td>
<td>4 h</td>
<td>Kitasato Research Center for Environmental Science</td>
</tr>
<tr>
<td>Virus</td>
<td>SARS-CoV-2</td>
<td>99.4% inhibited</td>
<td>6.7 m³</td>
<td>8 h</td>
<td>Texcell (France)</td>
</tr>
<tr>
<td></td>
<td>SARS-CoV-2</td>
<td>99.9% inhibited</td>
<td>45 L</td>
<td>2 h</td>
<td>Texcell (France)</td>
</tr>
<tr>
<td>Feline Coronavirus</td>
<td>Xenotropic murine leukemia virus</td>
<td>99.3% inhibited</td>
<td>45 L</td>
<td>2 h</td>
<td>Yamaguchi University Faculty of Agriculture</td>
</tr>
<tr>
<td>Influenza (H1N1 subtypes)</td>
<td>99.999% inhibited</td>
<td>45 L</td>
<td>6 h</td>
<td>Charles River Biopharmaceutical Services GmbH</td>
<td></td>
</tr>
<tr>
<td>Bacteria</td>
<td>Staphylococcus aureus</td>
<td>99.9% inhibited</td>
<td>25 m³</td>
<td>8 h</td>
<td>Kitasato Research Center for Environmental Science</td>
</tr>
<tr>
<td>Bacteria</td>
<td>Staphylococcus aureus</td>
<td>99.9% inhibited</td>
<td>20 m³</td>
<td>8 h</td>
<td>Danish Technological Institute</td>
</tr>
<tr>
<td>Pollen</td>
<td>Ambrosia pollen</td>
<td>99.4% inhibited</td>
<td>20 m³</td>
<td>8 h</td>
<td>Danish Technological Institute</td>
</tr>
<tr>
<td>Odours</td>
<td>Cigarette smoke odour</td>
<td>97% inhibited</td>
<td>Approx. 23 m³</td>
<td>8 h</td>
<td>Panasonic Product Analysis Center</td>
</tr>
<tr>
<td></td>
<td>Cedar</td>
<td>97% inhibited</td>
<td>Approx. 23 m³</td>
<td>8 h</td>
<td>Panasonic Product Analysis Center</td>
</tr>
</tbody>
</table>

Test results conducted under controlled laboratory conditions. Performance of nanoe™ X might differ in real life environment.

The latest nanoe™ X device uses a “multi-leader discharge” system that focuses the discharge to 4 needle-shaped electrodes, greatly expanding the hydroxyl radicals.

How nanoe™ X is generated
1. Atomised electrode produces condensation.
2. Electrical discharge is applied to the water.
3. nanoe™ X particles are generated

Panasonic heat pump with nanoe™ X technology verified against SARS-CoV-2

Virus SARS-CoV-2: 91.4% inhibited. Test conducted by TEXCELL (France), using a gauze saturated with SARS-CoV-2 virus solution exposed to Panasonic heat pump with nanoe™ X in a space of 6.7 m³ over 8 hours. Test report: 1140-01 C3. Performance of nanoe™ X might differ in real life environment.

First nanoe™ device was developed by Panasonic in 2003. After years R&D investments, the technology has been improved with launch of nanoe™ X.

480 billion hydroxyl radicals/sec

10x times

4,8 trillion hydroxyl radicals/sec

20x times

9,6 trillion hydroxyl radicals/sec

Panasonic heat pump with nanoe™ X technology verified against SARS-CoV-2

Where is nanoe™ X technology used?

Since 2003, nanoe™ has become a part of people’s lives in Japan and other regions.

Such technology can be found in diverse applications for cleaning air and surfaces, inside trains, elevators, cars, home appliances and personal beauty ... as well as in air conditioning.

Panasonic Heating & Cooling Solutions is incorporating nanoe™ technology in a wide range of equipment for residential applications as well as for commercial spaces and, it is a solution that does not require filters or maintenance and can work independently from heating or cooling.

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It has been adopted in people’s homes as well as in public facilities where improved air quality is desired, such as offices, hospitals, healthcare centres and hotels etc.

The nanoe™ X alleged effect and performance is only expected in the same room as where the unit is placed and will vary depending on the room size, room floor plan/layout, environment and usage.

The nanoe™ X has the potential to increase the indoor environment quality but is not a Medical Device. Local regulations on building design and sanitary recommendations must be followed.

nанe™ X: improving protection 24/7

HOME

Split and Multi Split. Built-in nanoe™ X Generator Mark 1

Wall-mounted Etherea Z.
CS-(M)Z**XXE. 7 capacities: 1,6 - 7,1 kW.

Wall-mounted Etherea XZ.
CS-XZ**XXE. 4 capacities: 2,0 - 5,0 kW.

Floor console.
CS-Z**UFEAW. 3 capacities: 2,5 - 5,0 kW.

Wall-mounted Heatcharge VZ.
CS-VZ**SKE. 2 capacities: 2,5 - 3,5 kW.

COMMERCIAL

PACi. Built-in or accessory nanoe™ X Generator Mark 1

4 Way 90x90 cassette.
S-***PU3E. 7 capacities: 3,6 - 14,0 kW.

PACi. Built-in nanoe™ X Generator Mark 2

Adaptive ducted unit.
S-***PF3E. 7 capacities: 3,6 - 14,0 kW.

Wall-mounted.
S-***PK3E. 5 capacities: 3,6 - 10,0 kW.

Ceiling.
S-***PT3E. 7 capacities: 3,6 - 14,0 kW.

VRF. Built-in nanoe™ X.

Panasonic Heating & Cooling Solutions is incorporating nanoe™ technology in a wide range of equipment

nanoe™ X Generator Mark 1, U2 Type 4 way 90x90 cassette.
S-***MU3. 11 capacities: 2,2 - 16,0 kW.

nanoe™ X Generator Mark 2, F3 Type adaptive duct.
S-***MF3. 12 capacities: 1,5 - 16,0 kW.

nanoe™ X Generator Mark 1, G1 Type floor console.
S-***MG1ESN. 5 capacities: 2,2 - 5,6 kW.

*Availability depends on country
More about Panasonic Heating & Cooling Solutions

www.aircon.panasonic.eu