



**UVR**  
*UV RESOURCES*

**Why UV-C Lamps  
Produce NO Ozone**

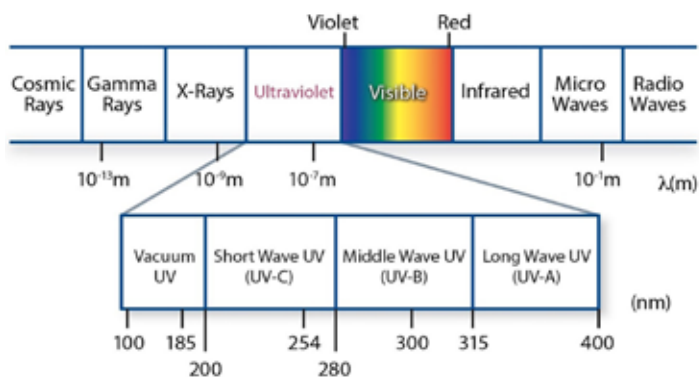
**OZONE**

# Differentiating UV-C from Ozone

The UV-C wavelength is an invaluable tool for an HVAC/R system. By leveraging germicidal energy to keep HVAC/R cooling coils free of microbial growth, facility managers enjoy the benefit of reducing the spread of airborne infectious agents.

However, some facility managers may be hesitant to seek these benefits for their application due to a concern about ozone. While the Ultraviolet spectrum contains four separate wavelengths—UV-A, B, C and Vacuum UV—each operates at different energy levels and only one is capable of producing ozone (Vacuum UV aka UV-V).

As you'll note in the graphic below, Vacuum UV operates in the 100-200nm range, where ozone is produced. UV-C, conversely, reaches its optimal germicidal strength near 253.7nm. Because ozone will only be produced below 200nm, at 253.7nm (rounded to 254nm), the germicidal wavelength does not include creation of ozone.



Most germicidal lamps, including those from UV Resources, are produced with doped quartz glass or “soft glass”, which **blocks the transmission of the 185nm ozone-producing wavelength**. The doped quartz glass allows the 253.7nm radiation to pass through, but it blocks wavelengths below 200nm from escaping. Therefore, germicidal lamps with doped glass CANNOT produce ozone.

## WHAT IS OZONE?

Ozone is present in low concentrations throughout the earth's atmosphere. Some researchers say that this chemical is “good up high, but bad down low.” Without the ozone layer protecting our Earth's stratosphere, for example, the Sun's ultraviolet radiation would make life on Earth uninhabitable. At street level, however, a high concentration of ozone is toxic to plants and animals. In humans, ozone can irritate nasal passages and cause nausea. Extended exposure can lead to lung inflammation.

Ozone, produced by Vacuum Ultraviolet (UV-V), is a gas molecule that contains three (3) oxygen atoms – and as such, it has a destabilizing effect on oxygen in the air (leading to irritation and danger to humans). A UV-V lamp generating the 185nm wavelength

can create ozone from oxygen (O<sub>2</sub>) by disrupting the O<sub>2</sub> molecule and splitting it into two oxygen atoms. These two oxygen atoms attempt to attach to other oxygen molecules (O<sub>2</sub>). It is the attachment of this third oxygen atom that creates ozone (O<sub>3</sub>).

Ironically, UV light, in the 240-315nm wavelength, will break the third oxygen atom attachment noted above and will convert it back to oxygen. The peak ozone destruction occurs at the 254nm wavelength. So, a UV-C lamp at the 253.7nm wavelength will actually destroy ozone!



UV-C Lamps = No Ozone

UV-C Lamps = Ozone Destruction

## SUSTAINABLE PERFORMANCE

Keeping buildings operating at their most efficient level and sustaining that performance over the life of a building is one of today's key challenges for specifying engineers, HVAC/R contractors and facility managers. Today, with germicidal technology, virtually all HVAC/R systems are potential candidates because of the many proven operational benefits it offers, including: (a) destruction of surface and airborne microorganisms; (b) the restoration and preservation of heat transfer and airflow capacities to “as-built” conditions; (c) greatly improved indoor air quality; and (d) reduced maintenance.



*UV-C Green Cleaning:*

*Chemical Free & No By-products*

While UV-C technology has been proven to restore HVAC/R performance to its original capacity, specifying engineers, HVAC/R contractors and facility managers can rest assured that the germicidal wavelength is incapable of producing ozone.



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