

# DEFENSELITE PATENTED VENTING SYSTEM NECESSITY EXPLAINED

## *Barometric air pressure / solar heat gain*

### **PREAMBLE**

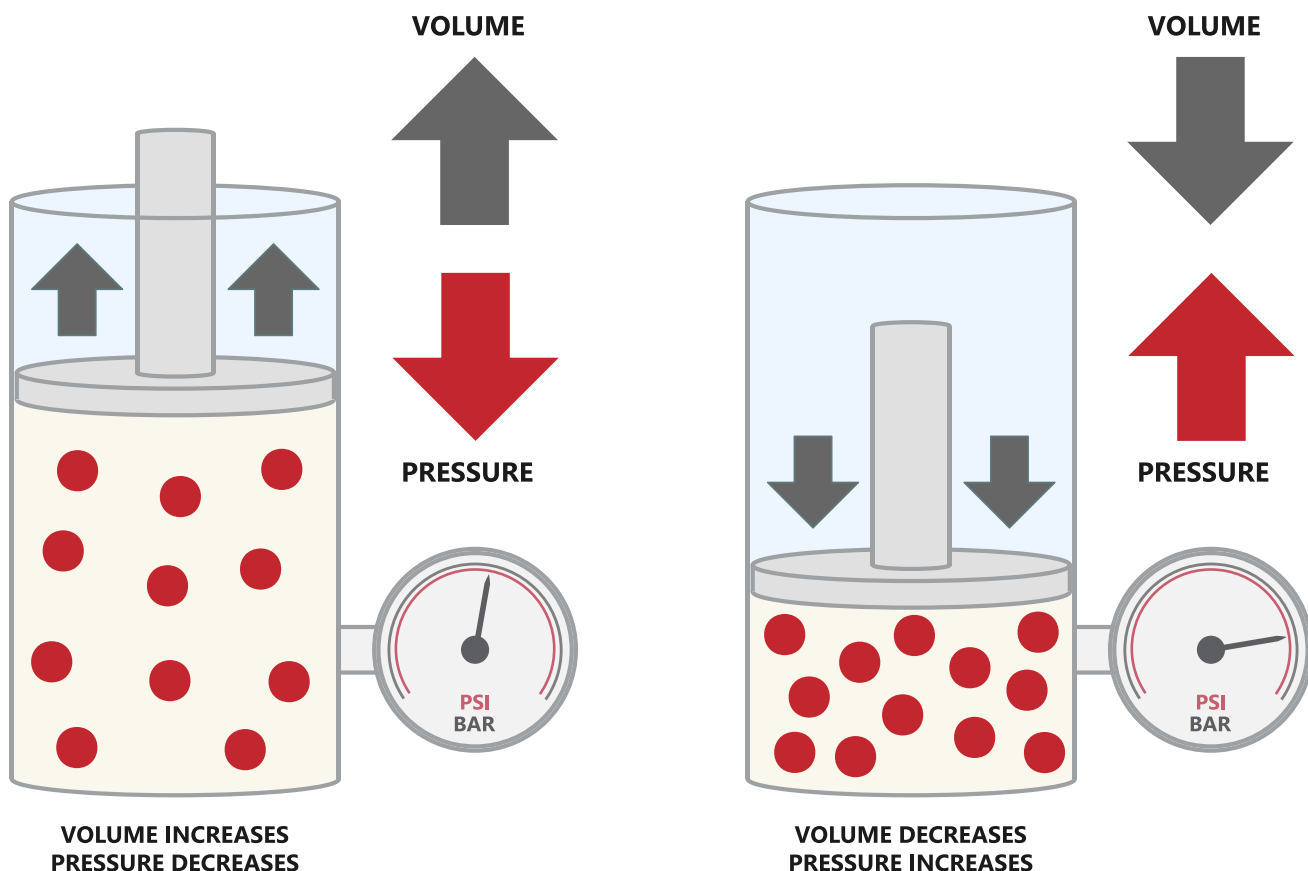
- Via application the DefenseLite® Forced Entry Prevention System creates an “over-glaze” condition wherein a new air cavity to the glazing structure is created. This condition will exist if DefenseLite is installed on the interior or exterior of any structure.
- Post application, an additional sealed air space has been sealed in. Without proper venting, this “sealed” air space will be under attack from solar heat gain and temperature variations. This excited trapped air condenses to a vaporous form causing pressure that causes condensation to form on the interior side of the DefenseLite shield and may present minimal risk to thermal fracturing of glazing substrates.
- While ordinary glass can conduct an electrical charge, none remains after removal of the charge. DefenseLite’s proprietary polycarbonate-based shield maintains a very slight static charge inherent to its composition and that is the attractant to water molecules. Given enough static charge that vapor, under pressure, can condense to actual water. Sometimes in noticeable amounts. This is all determined to site-specific conditions and geographical climate.

### **SOLUTION**

- Knowing the factual implications referenced above regarding sealing air within any “dead air” cavity, an equilibrium offset must be provided to vent this newly created sealed air space. This measure serves resolution to the following.
  1. Formation of condensation via excited molecular activity within the air space
  2. Increasing volume into the air space therefore decreasing pressure within the air space (see *graphic pg. 2*)



## Boyles Law



### BOYLES LAW

Utilizing Boyle's law, we offset the compression of normal air by implementing air release mechanisms, allowing the flow of conditioned (dry) air from inside the controlled structure through the dead air space and back into the conditioned area. This cycle allows dry air to enter the air space, negating condensation preventing molecular activity. This balanced pressure significantly reduces solar heat gain, therefore reducing thermal activity.

*Balancing both air pressure and air movement are critical benefits offered with the DefenseLite patented venting system.\**



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# Boyles Law Applied

*The following calculation is used on a 60" x 96" panel.*

*The DefenseLite panel installation is set at a one-inch standoff from the face of original glazing.*

Utilizing Boyles law, the normal air compression is offset by implementing air release mechanisms allowing the flow of conditioned (dry) air from inside the controlled structure through the dead air space back into the conditioned area. This cycle allows dry air to enter the air space, negating condensation preventing molecular activity. This balanced pressure significantly reduces solar heat gain, therefore reducing thermal activity.\*

## **Initial parameters of entrapped air =**

Initial pressure ( $p_1$ ) (normal air BPA)  
0.085 Pa

Initial volume ( $V_1$ ) (common to a cubic inch of 60" x 96" x 1")  
5,760 m<sup>3</sup>

Final parameters (desired net BPA under heat gain attack meaning total evacuation)  
Final pressure ( $p_2$ )  
5,750 Pa

Final volume ( $V_2$ ) (trapped air condensation after venting effect)  
67.num m<sup>3</sup>

From this applied math, the normal "air" condenses to vaporous form under attack of heat gain at 1.35 AP, therefore the sum of 0.67num is not nearly significant enough for water molecules to excite sufficiently to form water droplets or vapor.

For "air" to convert to vapor under typical atmospheric pressure conditions, water vapor is continuously generated by evaporation and removed by condensation. It is less dense than most of the other constituents of air and triggers convection currents that can lead to clouds. Under Boyle's Law, this means that very little to no condensation can or will occur once an "escape mechanism" is applied.

The amount of water vapor in the air of the DefenseLite cavity determines how frequently molecules will excite under solar heat gain—or not. When a net evaporation occurs, the body of water will undergo a net cooling directly related to the loss of water via the air vents, allowing conditioned air into the DefenseLite system.

\* Condensation is influenced by uncontrollable factors like weather, temperature, elevation, and barometric pressure, governed by natural physics beyond our control. The Moore Vent System, with Boyle's Law, aims to mitigate condensation by equalizing pressure, but complete elimination cannot be guaranteed. Effectiveness depends on specific conditions. Users are advised to consider the dynamic nature of environmental factors and recognize limitations in controlling natural phenomena. The system provides a proactive approach but does not claim absolute prevention under all conditions.



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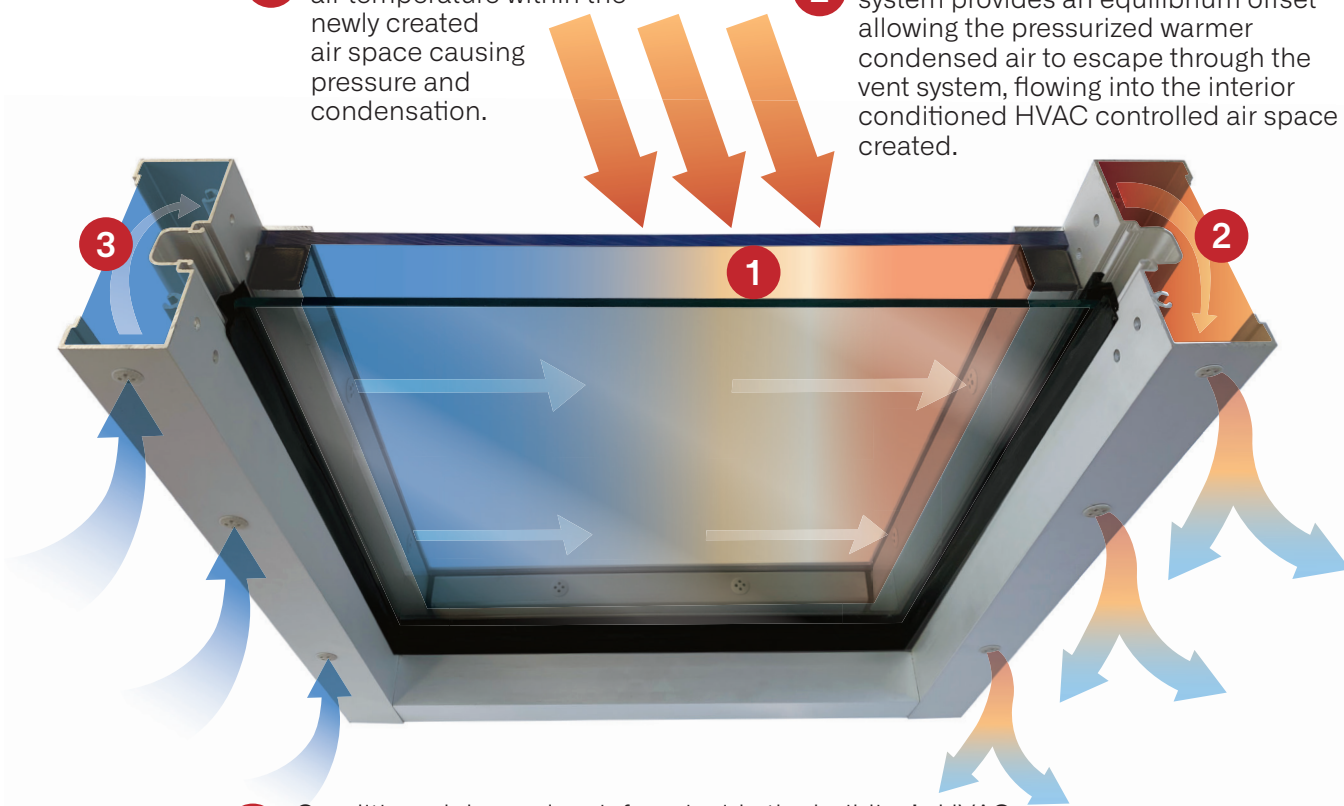
# DEFENSELITE® PATENTED VENTING SYSTEM

After the installation of DefenseLite or any over-glaze system, an additional air space is created. Without proper ventilation, this newly sealed air space is under attack from exterior solar heat gain. Trapped air condenses to a vaporous form causing pressure and condensation to form on the interior side of the over-glaze panel. An equilibrium offset **MUST** be provided to vent this newly created sealed air space.

## THREE STEP DEFENSELITE VENTING PROCESS TO MITIGATE CONDENSATION

**1** Solar heat gain increases the air temperature within the newly created air space causing pressure and condensation.

**2** The DefenseLite patented venting system provides an equilibrium offset allowing the pressurized warmer condensed air to escape through the vent system, flowing into the interior conditioned HVAC controlled air space created.



**3** Conditioned dry cooler air from inside the building's HVAC system is then transferred back through the DefenseLite patented venting system effectively exchanging the warmer, moist, condensed air with conditioned air, eliminating the risk for condensation.

The process of conduction in conjunction with the DefenseLite patented venting system allows the trapped warm air to find the cooler interior HVAC conditioned air and vice-versa. The DefenseLite patented venting system benefits both hot and cold environments, summer and winter, in all climate zones worldwide.



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