Humidity for Wineries

An in-depth look at the importance of humidity control in wine production to form the perfect environment for creating quality wines.

condair

Wine cellars must integrate systems that can accurately control the temperature and humidity of the space in all stages of wine production from aging to storage to ensure a consistent and high-quality product.

It is critical in winemaking that evaporation of the product is slowed down, but not stopped. This is where humidity control comes into play.

Introduction

The control of temperature and relative humidity (RH) within a wine cellar is an indispensable element to regularly produce high-quality products. Historically, winemakers have found that the ideal conditions to age wine is between 45°F and 65°F, with a relative humidity between 50 and 80 percent. The ideal conditions differ slightly based on certain winemakers, but 55°F and 70 percent relative humidity is considered ideal, nearly perfect by many.

As it turns out, the ideal conditions for wine aging were discovered centuries ago. Through years of trial and error, it was found that the best quality wine was aged in rooms below ground level, typically in the basement of a castle. Winemakers didn't know it at the time but the reason why it aged nearly perfectly, is because most wine cellars in Europe had an indoor climate close to 55°F at 70 percent relative humidity.

Angel's Share - Losses Due to Evaporation

When wine is aged in a wooden barrel, some of the liquid product evaporates and diffuses out into the space. After all, wood is not impermeable and therefore does not act as a vapor barrier. What is lost from evaporation is known as "the angle's share" due to the liquid disappearing skyward. In ancient history, the winemakers believed angels watched over the wine barrels and took a portion of the liquid as an allotment to ensure the proper quality of the product, hence the term. Evidently, wine cellars need to find a way to control the angel's share to optimize yield.

It is critical in the winemaking process that evaporation of the product is slowed down, but not stopped, since this concentrates the flavors in the wine. This is achieved by storing the wine barrels in spaces with high relative humidity. By ensuring a high relative humidity in the wine cellar, evaporation losses are limited due to the elevated water vapor content already present in the air.

As mentioned, the ideal relative humidity varies but most winemakers consider 70% relative humidity to be ideal. What happens if we can't reach a relative humidity of 70 percent? This not only accelerates the diffusion of vapor out of the barrels and the aging process but increases the angel's share. What happens if we exceed 70% relative humidity? Without a doubt, if the cellar reaches 80 to 90 percent relative humidity, the cellar will experience all kinds of mold.

Devil's Cut - Losses Due to Wood Absorption

In the same spirit of the angel's share, the devil also demands his share of the product. The "devil's cut" is known as the losses that occur when the wine is absorbed by the wood of the barrel. Wood is hygroscopic in nature, meaning it tends to absorb moisture through its surface from its external environment. Therefore, when the wood is in a dry climate, its hygroscopicity increases, and wine is lost through the absorption of the wood.

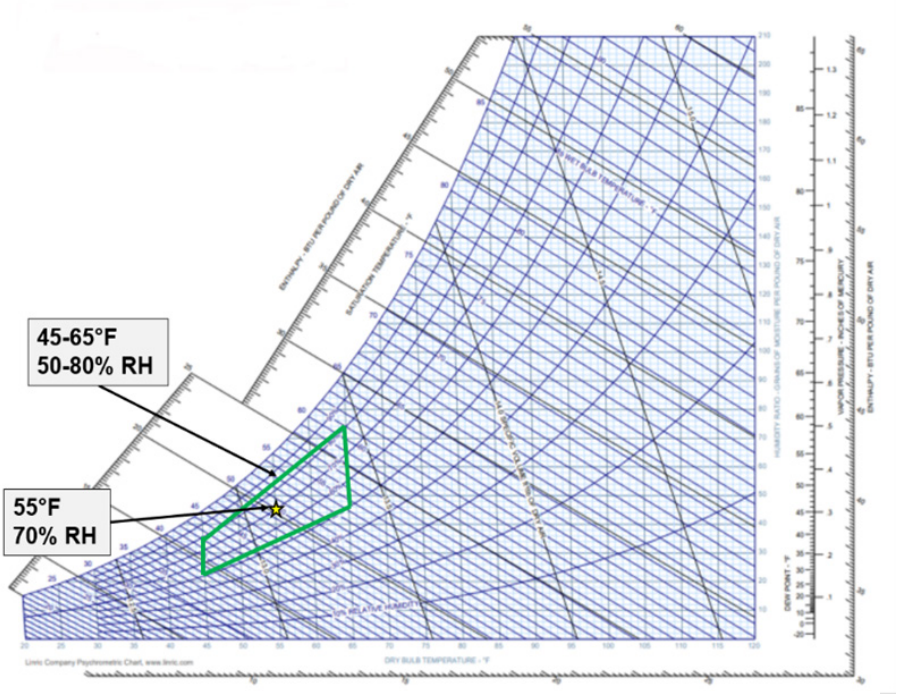
In the same way losses due to evaporation are limited, losses through wood absorption can be limited by ensuring a relative humidity of 70% in the space. By doing so, the wood will lower its ability to absorb wine due to it's already elevated moisture content. To reiterate the effects of 80 to 90 percent relative humidity, this will cause mold to grow and potentially damage and contaminate the wooden barrel and the product. Therefore, it is critical to ensure an ideal relative humidity of 70 percent in the space, as this will result in limited losses of wine and profit.

Cool Climate to Optimzied Aging

Obviously, the colder the space wine is stored in, the longer it will last. Why not store the wine in colder climates than 55°F? At these lower temperatures, the fermentation process ceases to occur in the wine, which means the wine is being "preserved" as opposed to "aged". Of course, this could have detrimental effects on the quality of the wine, as aging the wine is what gives it its flavor.

In that case, why not store the wine in warmer temperatures? Aging wine in a space with warmer temperatures can accelerate the fermentation process faster than desirable. Not only does it shorten the life cycle of the wine but fermenting the wine too quickly can result in flattening some of its aromas and flavors. An indoor temperature of 55°F is ideal for ensuring a proper aging process which results in a wine of high quality.

For these reasons, many consider anything between 45 and 65°F at 50 to 80 percent relative humidity to be admissible, while an ideal climate is considered 55°F at 70 percent relative humidity.



The ideal relative humidity of 70 percent in a wine cellar or storage facility will result in limited losses of wine and profit.

Protecting Quality of Materials

It may be surprising how much the materials used to store and bottle the wine can have an impact on its market value. For example, the value of a wine bottle is largely determined by the quality of the label alone. While this may be surprising to most wine consumers, the idea is if the label is damaged, it can foreshadow the quality of the wine itself.

Labels are traditionally paper-based; therefore, a relative humidity of 70 percent is on the high limit in terms of preserving its quality. Any higher and the relative humidity will damage the label. Any lower and the glue keeping the label intact can dry out.

Like labels, the corks also have a great impact on the value of the product. Too much humidity can allow mold to form on the corks. Too little humidity and the corks can dry out.

When corks dry out, it allows air to infiltrate the bottle and contaminate the liquid product. Furthermore, dry corks can lead to additional losses by evaporation from the bottle. In fact, wine bottles are stored sideways, so the wine keeps the cork wet to help close

Conclusion

Finally, we can conclude that the ideal climate for the winemaking process is a cool and humid space for the reasons previously stated. Arguably, the exact ideal conditions to age wine are 55°F with a relative humidity of 70 percent. Therefore, to ensure the best quality product, wine cellars must integrate systems that can accurately control the temperature and humidity of the space.

About Condair

Condair Group, founded in 1948 and based in Switzerland, is the global leader in humidification, dehumidification and evaporative cooling. Supported by science, we engineer individual, holistic solutions that customers can trust through the entire lifecycle. With optimal humidity, we increase productivity and create healthier built environments.

Condair Group has production sites in Europe, North America and China, its own sales and service organizations in 22 countries, and representatives in 50 locations worldwide. You can rely on our comprehensive portfolio of innovative technologies for air humidification, dehumidification and evaporative cooling for the entire lifecycle of each product.

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