APOLLO ENCLOSURES

ISOTROPIC BEHAVIOR STATEMENT

All LCD televisions and displays have a characteristic where if the surface temperature of the LCD screen gets to a certain threshold temperature, then the liquid crystal will cease to respond to electrical signals. Areas of the screen at or above this threshold temperature will be dark and have no image. This is known as the liquid crystal's isotropic stage. Once the temperature of the liquid crystal goes below this threshold the display returns to normal operation. This phenomenon does not damage the liquid crystal or the display itself.

There are LCD TV's and displays on the market constructed with a special high temperature liquid, which is designed to withstand heat build up of temperatures up to 230°F (110°C) before exhibiting any form of isotropic behavior. With this technology it is rare that the display will ever reach the temperature range between nematic, (where liquid crystal can be used as an active viewable display) and isotropic, (where liquid crystal stops working and the display turns black); therefore, making this an ideal product for direct sun installations.

Manufacturers, such as LG (with their IPS technology) and Samsung high bright Neo QLED, have commercial or lite commercial products that are designed to tolerate considerable exposure to solar radiation without exhibiting this isotropic characteristic. Air flow in the Apollo enclosures is contained in the top rear half of the unit. There are fans pulling fresh air in from the bottom of the enclosure and pushing the hot air out the top. This system works very well in most circumstances. The limitation is reached when the convection mechanism cannot remove the solar heat from the surface of the LCD fast enough and its surface temperature increases to the isotropic level, 167°F (75°C). This can happen within 15 minutes in areas of maximum solar exposure. Tilting or rotating the TV away from the direct sun will allow the LCD to cool down and the image will return with no permanent defect to the TV.

Apollo recommends when using consumer grade LCD TV's, you should pick an installation location that reduces the exposure to direct solar radiation. For those instances where this is not possible, such as in digital signage or direct sun installations, we recommend our Elite Direct Sun enclosures that provide additional protection of the TV with IR film and air flow between the TV and the enclosure glass. An alternate option is sourcing a digital display model to provide a robust solution to that problem.

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