How Does The Alumishield Work?

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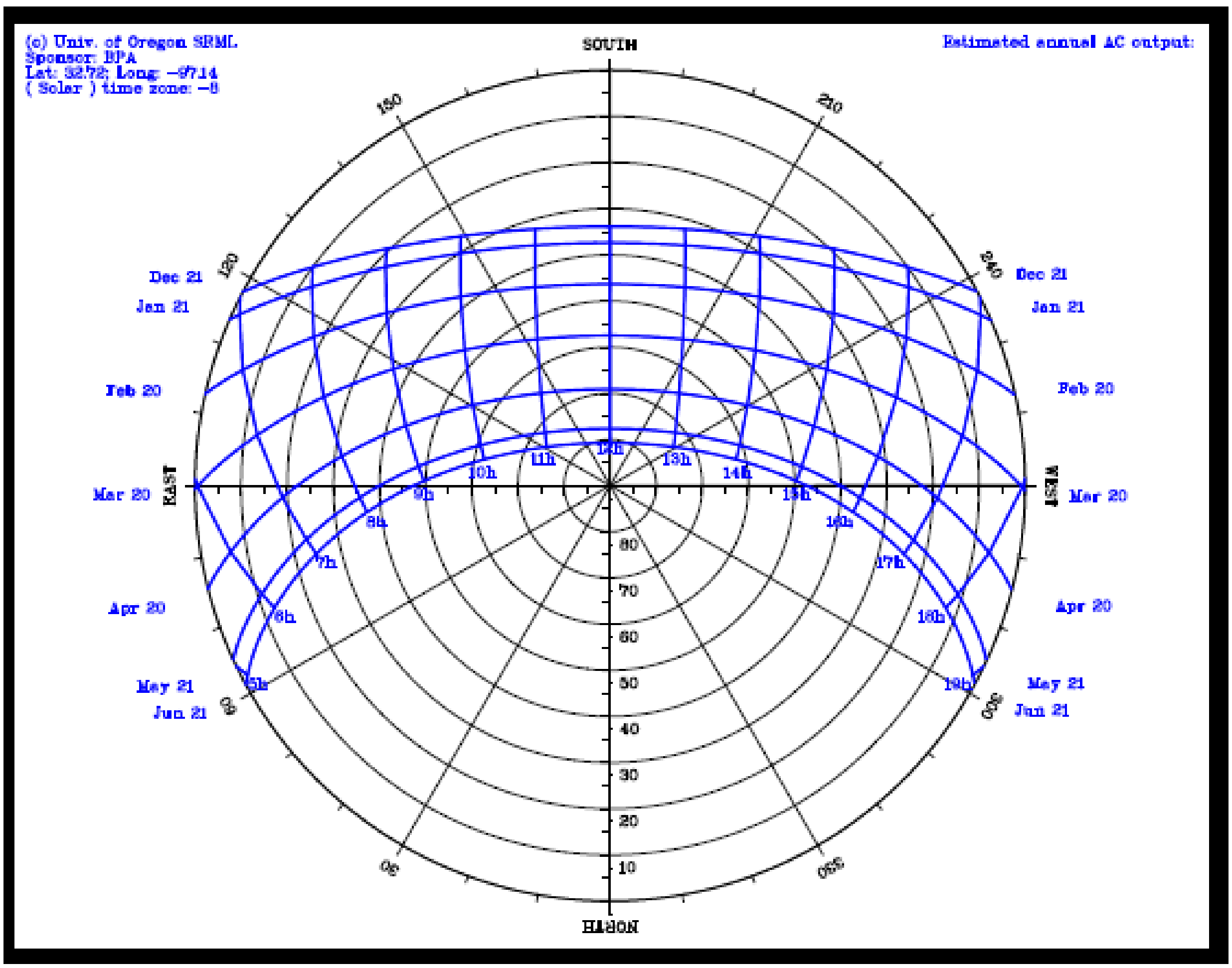
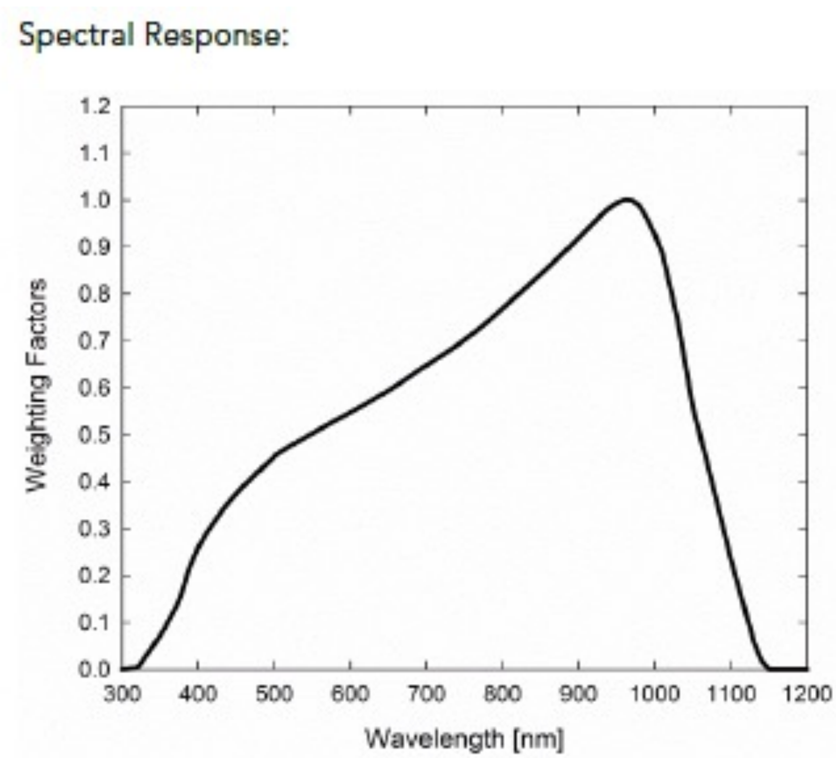
As it is with most of nature the arc of the sun is a sine wave which the elevation changes with the seasons of the year. The solar arc is basically a shallow elevation in the winter and a nearly vertical elevation in the summer. A solar day varies from 8 hours in the winter to 14 hours in the summer and as well all know the higher the sun the hotter it gets.

The following chart is a solar prediction chart from December thru June for a location in the Dallas/ Fort Worth area of Texas. The perpendicular axis of the position of the sun varies from 45 degrees to nearly 80 degrees depending on the season for solar noon. Solar noon can be anywhere between 12 AM and 2 PM (12:00 to 14:00 hours) depending on the time of year. The key point to remember is that the greater elevation of the sun to a point on the earth the less atmosphere the sun's energy has to travel through. The less atmosphere the sun energy has to travel through results in greater energy hitting the point on the earth.



The majority of the heating effect of the solar energy is in the Infrared spectrum which is just slightly above the visible spectrum.

At DDB we use a solar pyrometer to measure the solar effects at our test sites and at customers facility's in order to correlate the solar load on a cabinet. We use a unit manufactured by Apogee instruments that is calibrated in watts per meter^2. The spectral response of the unit is depicted in the following chart.



As you can see from the above chart the area of greatest energy is centered in the area of near and far Infrared spectrum which actually is what causes a cabinet surface temperature to rise. The majority of solar energy in the visible spectrum will cause minimal temperature rise.

The Alumishield as depicted in the picture above on top of an OD-50 series outdoor cabinet is attached to the top of the cabinet using four bolts. The displacement of the Alumishield is about ½ inch above the roof of the cabinet providing a slight standoff above the cabinet. Air as we all know is a very poor conductor of heat and this area under the Alumishield also provides a small amount of insulation between the Alumishield and the roof of the cabinet. There is also a 2 inch 45 degree overhang of the Alumishield that also serves as a rain drip guard at the edges of the Alumishield.

So the obvious question at this point is how can the relatively small Alumishield provide reduction of solar load to a cabinet. It has to do with the majority of the solar load occurring within an angular displacement of about plus or minus 15 degrees above the cabinet which is pre and post solar noon. The solar radiation within this period results in about 30 % to 40 % of the energy of the solar day. During this period the majority of the solar load is presented to the Alumishield and very little is presented to the side walls and the doors of the cabinet. The period of solar noon is the greatest amount of energy from the sun. Reducing the solar load during the peak of the solar energy appears to provide about 10 to 12 degree F reduction of internal cabinet temperature as compared to not having an Alumishield. Weather the cabinet is cooled by an air conditioner or direct air cooling this reduction in cabinet internal temperature by the Alumishield can help maintain a lower overall cabinet temperature.

The same effect can be achieved using solar shields.

The air insulator between the solar shield and the cabinet does not transfer the heat of the solar shield to the cabinet thereby reducing the temperature of the cabinet.

Note: The term Alumishield is a copyrighted term of DDB Unlimited Inc.