

MEASURING COOLING LOAD REDUCTION DUE TO SOLAR HEAT GAIN

Overview

As energy savings becomes increasingly important, more customers want measured data showing how much Madico films can decrease solar gain. Using a BTU meter, we now have a method of estimating the reduction in peak cooling load due to solar gain for each side of a building. This BTU meter measures the solar energy transmitted through a piece of glass. The units of the output are BTU per hour square foot, or the number of BTU's passing through one square foot of glass in one hour.

Procedure: Taking Measurements

1. You'll need a BTU meter and the film samples you are considering. A sampler book is fine, you only need a small piece of film.
2. These readings should be done on a sunny, cloudless day, between 1 and 3 pm when the building is experiencing a significant amount of solar gain.
3. You'll need to know the total glass areas on each face of the building.
4. Inside the building, take BTU readings on the North, East, South, and West faces of the building. Do one face at a time, measuring the existing glass followed immediately by each film you are considering. You can simply hold the film sample up to the glass, you don't need to install it. Be sure to keep the BTU meter about 2-3 inches away from the glass for all your readings. Aim the meter so that it's pointing towards the sun, reading the direct sunlight. If there is no direct sunlight on a face, aim the meter perpendicular to the glass, pointing directly out the window. You can take the reading on any floor of the building so long as there is no shading blocking the sunlight.
5. To calculate cooling load from solar heat gain, you multiply the BTU/hr sq ft measured times the total glass area for that face. Calculating this with and without window film gives you the reduction in cooling load due to solar heat gain at that time of day. We have created an excel spreadsheet that will do these calculations for you. Open the attached spreadsheet and do the following:
 - 1) Enter the basic project information in the YELLOW cells.
 - 2) Enter the total glass area of each face in the ORANGE cells.
 - 3) List the glass type and Film Options in the YELLOW cells.
 - 4) Enter your BTU measurements for each film and face in the ORANGE cells.



Hold the film sample on the surface of the glass, and the BTU meter 2-3 inches from the surface.

This will calculate the cooling load reduction for each film on each side of the building, and also give you the total cooling load reduction for the whole building.

Analysis:

These values calculated on the spreadsheet are the reduction in cooling load due to solar heat gain for that specific time of day. The cooling load changes over the course of the day and with changing weather. At other times the building may see a larger or smaller reduction. And at night, for example, there will be no reduction.

In addition, there are factors other than solar heat gain that affect a building's cooling load. Thus we can't estimate the dollars saved using the method outlined above. Keep in mind though that solar heat gain can be the largest contributor to a building's cooling load, so it's important to provide measured data showing the effectiveness of the film. Many building engineers will be interested in this type of data, and used in conjunction with temperature data loggers it provides excellent measured on-site data.

The approved BTU meters for this procedure are the EDTM 1065 and 2065, which are item numbers 444211 and 444212 in the Madico Tool Catalog. Contact your nearest Madico Branch to order your BTU meter today!