

DESIGN &
ENGINEERING
SERVICESDISPLAY CASE SHIELDS REDUCE
SUPERMARKET ENERGY USE

The tests showed that using the shields during closed hours helped product to stay colder, even though the shields were open during business hours.



Aluminum shields reduced infiltration and radiation heat transfer into the display case from the surrounding environment.

“Rigorous testing at our Refrigeration Technology and Test Center confirmed this technology’s benefits for our customers.”

*Gregg D. Ander, AIA,
Chief Architect,
Engineering Services Manager
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Today’s supermarkets operate on narrow profit margins, and annual energy costs for a supermarket can equal or exceed those margins. Most of these costs are incurred by the refrigeration systems, where thermal radiation and convection of warm air into cold display cases accounts for a large portion of the refrigeration load.

To reduce heat transfer, supermarkets can use low emissivity shields to cover open display cases, thereby reducing power use while maintaining product temperature. Any reduction in refrigeration load can lower a supermarket’s energy costs and improve its competitiveness. Furthermore, increasing the products’ shelf life can enhance the store’s profit margin.

Southern California Edison recently tested the impact of low emissivity aluminum shields on the power use and thermal performance of a typical multi-deck display case used for storing dairy

products. To perform these tests, Edison used the sophisticated instrumentation and data acquisition system at its state-of-the-art Refrigeration Technology and Test Center (RTTC) in Irwindale, Calif.

RTTC’s monitoring equipment tracked the refrigeration system’s temperature and pressure points during the operating hours of three typical supermarket scenarios:

Scenario 1 - Base case: Non-24-hour store with no shields applied during closing hours.

Scenario 2 - Night: Non-24-hour store with shields applied for six hours during night closing.

Scenario 3 - Holiday: Store closed for 24-hours with shields applied for 24 hours.

Edison then used the collected test data to determine the effectiveness of the display case shields.

The results on the next page show that using these aluminum shields can reduce the energy usage of supermarkets.



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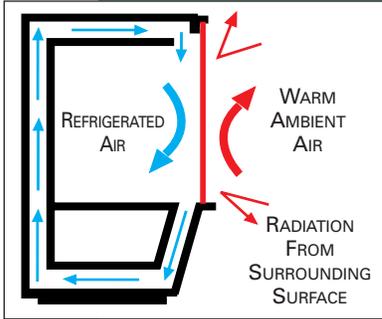
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USE OF SHIELDS AT NIGHT KEEPS PRODUCT COLDER DURING THE DAY

The RTTC's testing for scenarios 2 (night) and 3 (holiday) revealed that the low-emissivity shields:

- Reduced radiative and infiltration heat transfer into the case, thereby reducing power use while improving product temperature maintenance.
- Reduced refrigeration load by 8.5 percent (night) and 41.0 percent (holiday) and reduced compressor power by 9 percent (night) and 36 percent (holiday).
- Increased the effectiveness of the display cases to hold desired product temperature. The average product temperature was 3° F colder on the upper shelves and 5° F colder on the lower shelves with the shields closed.
- Maintained lower product temperatures up to 15 hours after the shields were opened. This can allow for greater food product integrity during business hours, after the shields are opened.
- Reduced heat rejection to the condenser by 7.4 percent (night) and 38.7 percent (holiday), which could decrease condenser size and cost in new construction.
- Maintained lower discharge air temperature during defrost cycles, meaning that merchandise was likely to maintain more stable required temperatures.
- Provided the most reduction in refrigeration load and power use during extended periods of application such as holidays.
- Reduced the effectiveness of off-cycle defrost to melt frost on the coils, since it took longer to defrost the coils when the shields were closed.

In conclusion, RTTC engineers determined that the aluminum display case shields reduce energy use and operation cost, thereby contributing to the potential profitability of a supermarket operation.



The low emissivity shields reduced the radiative and conductive heat transfer into the refrigerated space.

FOR MORE INFORMATION about how Southern California Edison's Refrigeration Technology and Test Center can help you improve your company's energy efficiency and profit margin, call your SCE account executive, or call the RTTC at (626) 812-7660, or visit www.sce.com



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