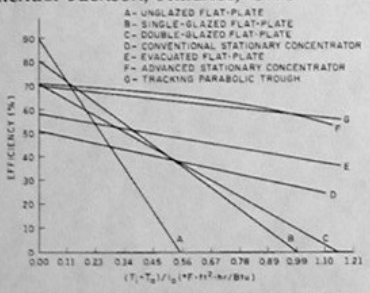
QUESTIONS & ANSWERS

Efficiency Curves

Q: What is the percent difference in efficiency between tracking and non-tracking collectors, and between flat-plate and evacuated-tube collector arrays?—*Michael Jackson, Alliance, Ohio*



A: The accompanying graph, from a publication of Canada's National Research Council, shows efficiency curves for three kinds of flat-plate collector, two types of stationary concentrating collector, and a tracking parabolic-trough concentrating collector. As you can see, differences in efficiency depend on the temperature range the collectors will be operating in. Unless you plan to use the collectors for high-temperature applications and are willing to pay for more complex equipment that will produce higher efficiencies, you may be better off with less expensive stationary flat-plate collectors (see "Rising Hopes for Vacuum Tube Collectors," *Solar Age*, 6/82).

Below-Grade Polyisocyanurate

Q: The articles I read concerning the insulation of concrete slabs refer to extruded polystyrene for underneath the slab and for perimeter treatment. Except for Owens-Corning literature that recommends use of its Energy Shield sheathing, foil-faced polyisocyanurate seems to be ignored. Why is this?—*Steve Scheller, Falls Church, Va.*

A: The only published research to date on underground applications of rigid-foam insulation is a study by Dow, in which samples of insulation were buried for extended periods and later unearthed. In these tests, the foil-faced polyisocyanurate insulation did not fare so well, absorbing *on average* 5 percent water by volume and losing 40 percent of its R-value. Manufacturers of the foil-faced products argue that the tests are not valid because 1) the 2-foot-square samples used have proportionately far more edge area than full sheets do (edges are torn cells that are open to moisture) and 2) the applications did not resemble a typical application, but a worst-case scenario.

The major manufacturers of foil-faced polyisocyanurate, Owens-Corning and Celotex, both recommend its use below grade for foundation wall and underslab applications. Recommendations vary among different manufacturers, but in general they recommend taking extra care while backfilling so as not to puncture the foil facing. They also recommend good drainage around the foundation so the panels are never immersed in water. Specifically, Celotex recommends that the panels be protected during backfilling with a rigid material such as fiberboard sheathing. Owens-Corning recommends that all joints and edges below grade be covered with aluminum tape.

For comparison's sake, extruded polystyrene has higher compressive strength than polyisocyanurate, but both have similar water absorption properties as measured by standard tests. Both are over 90-percent closed-cell foams.

Owens-Corning is currently monitoring some samples buried this summer. They may have data available next year when they dig them up. For now, we must rely on scanty published data and manufacturer's recommendations. Also, remember that each foil-faced product has its own chemical makeup and facing material.

Vertical Solar Shades

Q: While there seem to be plenty of sources for exterior and solar blinds with horizontal fins, slats, or louvers, I have had no luck finding exterior shades with *vertical* elements that retract and adjust. I have a number of projects with a western exposure overlooking the ocean, where only a vertical shading device can maintain a partial view, while blocking direct sun from above, straight on, and below (reflected from the water).—*Chris Hendricks, Los Angeles*

A: This is a tall order indeed! Louvered devices that effectively block all direct sun from all angles you mention would have to have both vertical (for low west sun) and horizontal (for straight-on and water-reflected sun). This adds up to an egg-crate configuration that would probably cut too much view to be acceptable.

Vertical-louvered systems made for commercial projects could be adapted, but not cheaply. The Moore Co. (Marceline, Mo. 64658) makes an adjustable vertical system with 8-inch aluminum blades that they could tailor to your requirements.

We suggest you consider using an exterior woven polyester shade screen, either fixed or roller-mounted. Available in many colors, they will reduce solar gain by up to 84 percent, but still allow some visibility through. They can be manually or motor-operated, or even automated to respond to sunlight (Phifer Wire Products, P.O. Box 1700, Tuscaloosa, Ala. 35403; Levolor Lorentzen, 1280 Wall St. West, Lyndhurst, N.J. 07071).