Passive Energy Reduction Technology

**Inflector Solar Shades**

“Reducing the Carbon Footprint of Commercial Buildings”

Inflector typically reduces heat loss by 35%-40%

Building Research Establishment
Inflector Solar Shades

What are Inflector Solar Shades?

Inflector Solar Shades are a unique, energy saving product that has been in the market for 25 years. It acts as a solar filtering, reflective, thermal shade that aids in stabilising indoor temperature, allowing in natural light and reflecting back solar heat and UV rays, providing a safer, more comfortable environment along with lower energy bills.

Inflector addresses all of the seasonal changes by retaining heat in the building during winter and reducing heat gain by the building during the summer. It provides a permanent solution for high energy bills.

The Inflector technology was initially developed by NASA in the 1960s, for the space suits worn by astronauts. It was the only material capable of combating the extremes of heat and cold in space. The material consists of micro thin layers of dielectric coatings with high and low refractive indexes combined with micro-thin layers of highly reflective aluminium. The metal is coated to a polyethylene sheet, laminated to a sheet of carbon graphite PVC which is then perforated, embossed, and laminated to a sheet of clear UV filtering polyester. The overall thickness of the material is 0.4mm.

Inflector Solar Shades are the result of many years of research and development, refined into the product we offer you today.
Inflector: Innovative Window Insulation Technology

A passive solution which addresses more than just the reflectance of solar heat gain.

The Inflector Solar Shades work on the basis of its three properties listed below. Aluminium was chosen to address the first two properties:

1. **Reflectivity** - to reflect solar heat gain back out through the window
2. **Emissivity** - most importantly aluminium has a low emissivity of between 0.03 and 0.05. This means that only 3% to 5% of radiant heat is emitted through the aluminium.
3. **Absorption** - the reverse side (black side) of the Inflector material acts as a one-way passive solar collector; absorbing the sun’s rays and radiating the heat into the building thus reducing the load on the heating system.

Inflector Solar Shades are uniquely engineered to provide solar filtering and offer a range of installation options to suit the building’s interior design. The reflective thermal shades aid in stabilising indoor temperature allowing natural light in and reflecting back solar heat and UV rays to create a safer, more comfortable environment along with lower energy bills.

**Inflector prevents:**

- **AIR INFILTRATION 71%**
- **UV RAYS 92%**
- **SOLAR HEAT 82%**
- **SOLAR GLARE**
- **HIGH ENERGY BILLS**
Windows are the weakest part of the building envelope

Windows allow unwanted glare, heat & damaging UV rays to enter buildings and generated heat to escape.

Windows are the weakest part of the building envelope and account for heat gain within a building in the summer and heat loss in the winter. Heat gain increases cooling costs and heat loss increases heating costs. In reality windows are thermal sink holes.

A single pane clear window is 20 times less energy efficient than the wall area they replace; and double pane Low-E windows are 10 times less energy efficient than the wall area they replace. This means that on average a building can lose more than 30% of its heat or air conditioning energy through its windows.

While the amount of heat loss or heat gain through windows depends on whether the windows are single pane glass, clear double pane, Low-E coated, or gas filled, the fact is if you have windows you have heat gain and or heat loss every day of every year.

Windows lose and gain heat through a combination of four factors, namely:

1. Conduction
2. Radiation
3. Convection
4. Air Leakage

“Energy loss through glazing (windows) is the largest and most variable loss in buildings and has major implications on energy consumption and peak heating and cooling loads”

2009 Buildings Industry Data Book
In summer windows provide desirable daylight and a view, but also allow infiltration, unwanted glare, heat gain and damaging UV rays to enter buildings. This results in:

- increased greenhouse effect
- increasing interior temperatures
- high cooling/air conditioning costs
- decreasing comfort and reduced worker productivity
- UV damage to furniture, carpets, etc.

While windows allow daylight and solar gain which we want in the winter they also allow the sun’s damaging UV rays to enter through the windows. Additionally, heat escapes through the windows when it is colder outside than inside. There is also heat loss due to exfiltration (air leakage).

“In 2012 buildings accounted for about 37% of all the UK’s carbon emissions”

Department of Energy and Climate Change
Inflector Solar Shades during Summer months

Inflector Solar Shades address all deficiencies of the building envelope pertaining to windows. The shades effectively give beneficial control over reflectivity, emissivity, absorption, radiant heat gain, solar heat gain, privacy, infiltration, condensation and heat loss in the winter; as well as being a passive solar collector, absorbing sunlight and radiating free heat into the building.

**Summer Benefits & Value**

In the summer the Inflector Solar Shades are positioned so that the silver side faces out which:

- reflects 72% of radiant heat back out through the window (reducing the greenhouse effect in buildings)
- reflects 65% of solar gain back out through the window (reducing overheating in buildings)
- reflects 92% of damaging UV rays back out through the windows (reducing fading & sun damage)
- reduces cooling requirements saving energy, CO2 and money
- controls glare (especially for computers & televisions)
- provides daytime privacy (one way vision)
- provide cool day lighting with a view
- reduces the load, wear, & maintenance on HVAC units

**Solar heat reflected from a building due to installing Inflector**

<table>
<thead>
<tr>
<th>Window Type</th>
<th>Percentage heat coming through the window</th>
<th>Incoming heat reduction using Inflector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Inflector</td>
<td>With Inflector</td>
</tr>
<tr>
<td>Single Pane</td>
<td>85%</td>
<td>17%</td>
</tr>
<tr>
<td>Double Pane</td>
<td>70%</td>
<td>15%</td>
</tr>
<tr>
<td>Double Pane Low-E</td>
<td>54%</td>
<td>13%</td>
</tr>
</tbody>
</table>
Inflector Solar Shades during Winter months

Inflector Solar Shades act as a solar collector in Winter, radiating heat into the buildings thereby reducing heating costs.

Winter Benefits & Value

In the winter the Inflector Solar Shades are reversed so that the silver side (aluminium) is facing inward to reflect the thermal heat back into the building and reduce heat loss through the windows.

Windows with direct exposure to the sun become passive solar collectors with the black side of the Inflector absorbing the sun’s rays and radiating the heat inward. For example a 1.5m² window with an inflector panel in direct sunlight can produce 2,096 BTU’s of heat per hour, which is equivalent to a 600 watt electric heater.

- damaging UV rays are reflected back outside
- the load, wear, & maintenance on HVAC units is reduced
- reduces heating requirements saving energy, CO2 and money
Inflector Application

More cost effective & energy efficient than replacing the windows or window treatments.

The Inflector Solar Shades will be of particular interest to commercial property owners, property management companies & facilities managers looking to lower energy costs and increase the thermal comfort within their buildings. They offer:

- increased occupier comfort and reduced complaints
- tenant retention due to more usable space – eliminates hot and cold spots
- updates building appearance without changing the overall exterior appearance
- rapid return on investment

Inflector Solar Shades are a proven alternative to window replacement offering a more cost effective, energy efficient and significantly less disruptive option.

The Inflector installation below highlights the difference in Visible Light Transmission (VTL) through the Inflector shades and the row of style block-out shades above. The block-out shades simply heat-up and radiate the heat into the building adding to HVAC demands and worsening the occupants’ thermal comfort.

Inflector has been installed in a variety of buildings across the UK including, Department of Justice - London, Visa Building - Birmingham, BRE Innovation, Ark - Watford, Blackburn Town Hall, United Biscuits Factory.

Installation Options

Inflector can be installed as either a roller blind as in the library opposite, a fitted screen as shown below or as a vertical blind shown overleaf. The internal and external pictures of the office below demonstrate how Inflector provides daytime privacy for the occupants within the building without significantly compromising their view.

Configured as vertical blinds provides the easiest switch from silver to black, dependent on season and offers a very effective retrofit option to any existing standard vertical blind installations.

Blind Dimensions

Choice of vertical or roller blinds – max. 4m long
Vertical blinds: 89mm or 127mm vane width
Roller blinds: up to 130cm wide.
## Inflector Solar Shades
### Performance Results

<table>
<thead>
<tr>
<th>SOLAR ENERGY REJECTION</th>
<th>DAYLIGHT ILLUMINATION</th>
<th>ENERGY SAVINGS (HEATING &amp; AIR CON)</th>
<th>PAYBACK</th>
</tr>
</thead>
<tbody>
<tr>
<td>82%</td>
<td>Over 4850LUX</td>
<td>Up to 45%</td>
<td>1.5-2.5 Years</td>
</tr>
</tbody>
</table>

**Visibility through Inflector Solar Shades configured as vertical blinds.**

### SOLAR ENERGY
- Transmittance: 17%
- Reflectance: 44%
- Absorbance: 39%

### VISIBLE LIGHT
- Transmittance: 25%
- Reflectance Out: 49%
- Reflectance In: 6%

### PERFORMANCE INDICATORS
- UV Light Blocked: 92%
- Infrared Light Blocked: 84%
- Emissivity: 0.9%
- Total Solar Energy Rejected: 82%

### Retrofit Arrangement (Double Glazed Unit)
- Shading Coefficient: 0.3
- Solar Heat Gain Coefficient (G Value): 0.25
- U Value - W/m2K: 1.48

### TECHNICAL SPECIFICATIONS
- Weight (g/m²): 284.6
- Thickness (mm): 0.43
- Flame Spread Index: 0
- Smoke Development Index: 105
- Tensile Strength MD (daN/mm²): 2.44
- Elongation at Maximum Load MD: 62.69%

---

Put our services to the test, contact us for a free consultation today.

**Office:**
Southwold House
Woodland Lane, Chorleywood
Hertfordshire, WD3 5LS

Call Free: 0800 210 0288
Email: info@arc-ers.co.uk
Web: www.arc-ers.co.uk