

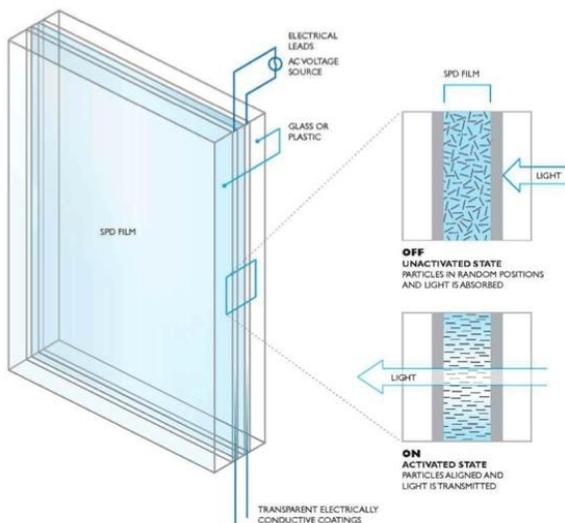
SPD-SMARTGLASS™

BUILDING ENERGY MANAGEMENT

Energy efficient SPD-SMARTGLASS is the world's highest-performing "dynamic" glazing. It regulates the amount of light, glare and heat transmitted through windows and other products. Developed by Research Frontiers Inc., SPD-SMARTGLASS uses light-control film produced by Hitachi Chemical Co., Ltd.

SPD-SMARTGLASS is now offered globally through licensed suppliers and their partners for commercial and residential projects. SPD-SMART™ windows, skylights, partitions, doors, atria and more are available in standard and custom configurations for new construction, replacement and retrofit projects.

HOW IT WORKS



SPD-SMART film contains microscopic particles. Regulating the voltage to the film adjusts the particles' orientation, instantly and precisely controlling the passage of light, glare and heat through the film. SPD-SMART film is laminated between panes of glass or plastic substrates. Laminated panels are ideal for applications such as conference room partitions and interior doors. Fabricated SPD-SMART insulated glass

units (IGUs) are exceptionally energy efficient and used for most exterior applications.



SPD Control Systems Corporation provides the **Building Energy Management Control System (BEMCS)** used to dynamically manage solar heat gain through windows in buildings throughout the day, 365 days a year, and dependent upon geographic location, so as to reduce the energy requirements of HVAC and lighting systems in the building. As much as 25% of a building's energy cost can be saved through SPD-SMARTGLASS and our control system.



Photos above: SPD-SMARTGLASS in dark and clear states at Research Frontiers' Design Center in Woodbury, NY.



SUSTAINABILITY: EXAMPLES

- Optimally timed daylight harvesting, thereby reducing electricity needed for artificial lighting while still satisfying task lighting needs
- Intermediate and fully clear states preserve views and support occupant well-being
- Unpowered dark state reduces interior heat build-up, thus lowering cooling costs
- Exceptional solar energy control manages heat gain and energy used for heating and cooling
- Unpowered dark state efficiently reduces nighttime light pollution
- UV-blocking minimizes degradation of interiors and harmful effects to occupants

POTENTIAL LEED® CREDITS (POINTS IN PARENTHESIS)

New Construction and Major Renovations

Energy & Atmosphere	• Credit 1: Optimize Energy Performance (Up to 19 points)
Indoor Environmental Quality	• Credit 6.1: Controllability of Systems – Lighting (1) • Credit 6.2: Controllability of Systems – Thermal Comfort (1) • Credit 7.1: Thermal Comfort – Design (1) • Credit 8.1: Daylight and Views – Daylight (1) • Credit 8.2: Daylight and Views – Views (1)
Sustainable Sites	• Credit 8: Light Pollution Reduction (1)
Innovation in Design	• Credit 1 – Innovation and Design (Up to 5 points)

Existing Buildings: Operations & Maintenance

Energy & Atmosphere	• Credit 1: Optimize Energy Efficiency Performance (Up to 18 points)
Indoor Environmental Quality	• Credit 2.2: Controllability of Systems – Lighting (1) • Credit 2.4: Daylight and Views – Views (1)
Sustainable Sites	• Credit 8: Light Pollution Reduction (1)
Innovation in Operations	• Credit 1 – Innovation in Operations (Up to 4 Points)

LEED® is a registered trademark of the U.S. Green Building Council. Potential credits also exist for other LEED categories including LEED for Schools and LEED for Homes

TECHNICAL DATA

Visible Light Transmittance	• Unpowered: <1% (Dark) • Powered: >50% (Clear)
Contrast Ratio	• As high as 170:1
Number of Light-Control Levels	• Unlimited
Switching Speed	• 1 - 3 Seconds
Control Over Incoming Solar Energy	• Solar heat gain coefficient (SHGC) as low as 0.06 (blocks 94% of solar energy) • Wide range of control over incoming heat; adaptable to regions and weather conditions
Daylight Harvesting Capability	• Fast switching speed and wide range of light transmission harvests more daylight when compared to static tints; electricity for artificial lighting can be reduced
UV Protection	• Over 99%
Voltage	• AC
Power Consumption	• Nominal; As low as 0.06 watts/ft ²
Width	• 3+ feet (>3+ feet when SPD film is “seamed” within a laminated panel)
Length	• No limit; panels up to 9 feet long have been installed
Substrates	• Glass or plastic
Simple Curves	• Yes
Insulated Glass Units, Custom Shapes and Fabrications	• Yes
Controllers	• Manual, timing and remote • Sensors (light, heat, motion) • Integration with intelligent building systems
Durability	• Tested at millions of on/off switching cycles

TO LEARN MORE, PLEASE CONTACT:

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