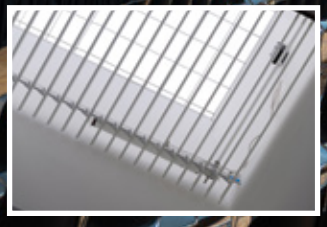
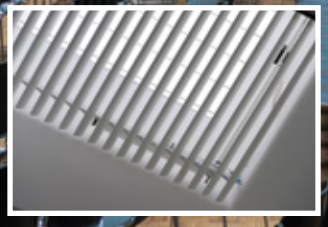
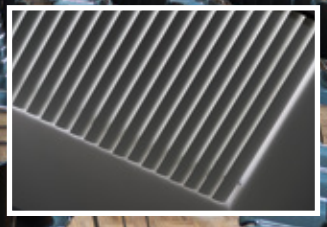
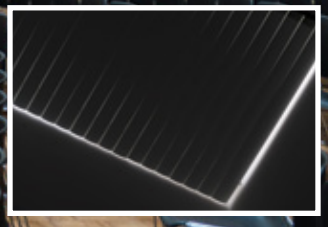
DRAPER® SOLAR CONTROL SOLUTIONS

Product Overview

DRAPER® SOLAR CONTROL SOLUTIONS

Introduction

Solar Control Solutions

Draper is an established company with over 110 years' experience in the manufacture of roller shades. The company first manufactured manual roller shades for schools and, over the years has developed a broad range of roller shade systems for commercial, institutional and residential projects. The range includes manual and motorized systems, skylight shades and bottom-up shades as well as control systems to operate them.

More recently, Draper has introduced a range of exterior and specialty shading systems to complement the existing roller shade systems and to provide increased levels of solar control. Energy from the sun is short wave and carries very little heat. Heat is only produced when the solar energy is absorbed by a surface (carpets, furniture, your clothing and skin) and is then radiated as long wave infrared energy. In broad terms, an exterior system is more effective than an interior one because it prevents a large part of the sun's energy from reaching the glazing and entering the building. If the solar energy doesn't get into the building, it doesn't have to be dealt with and the size and ongoing running costs of the HVAC system can be reduced.

In addition to addressing heat gain, Draper range of solar control products also includes systems that assist in the daylighting of spaces. In a commercial office building, more than one third of energy costs are incurred through the use of artificial lighting. Making effective use of natural daylight can therefore result in significant savings being achieved.

The aim of this brochure is to highlight the range of solar control products that Draper is able to offer as well as the ability of the company to modify existing systems or to create custom shading solutions to meet specific architectural requirements.

If further information is required, please go to the Draper website ***www.draperinc.com*** or contact Draper directly.

Omega™

Draper's Omega™ Venetian Blinds are one of the most flexible shading systems available. They can be installed on the interior or exterior as well as in double façades. They have one of the lowest shading coefficients of any system, reducing the solar energy that gets into a building by as much as 92%, therefore significantly reducing energy costs for cooling. With Omega venetian blinds, the slats can be tilted as required to provide effective solar control or can be retracted completely if there is no sun on the façade.

The Omega venetian blind system has excellent view through when the slats are in the horizontal or partially tilted position and provides glare control as the slats are tilted to prevent direct sun penetration. The slats in an Omega venetian blind system are physically connected to the ladder braid using a double omega connection to ensure that the system is stable in the wind and that the slats do not flutter.

Omega venetian blinds handle wind loads up to a maximum speed of 38 mph (61km). Motorized exterior systems are equipped with an anemometer control system to automatically retract the blinds if the wind speed exceeds the maximum allowable value. Blinds can also be automatically deployed, tilted and retracted in response to the sun conditions in order to provide optimum solar control.

Key Features

- Range of slat sizes available:
  - 50mm ($1\frac{15}{16}$") flexible
  - 60mm ($2\frac{3}{8}$") flexible
  - 60mm ($2\frac{3}{8}$") rolled edge
  - 80mm ($3\frac{1}{8}$") flexible
  - 80mm ($3\frac{1}{8}$") rolled edge
  - 100mm ($3\frac{7}{8}$") flexible
  - 150mm ($5\frac{7}{8}$") flexible
- Solid and perforated slats available. Perforation options—Full perforation, highway perforation, half perforation, 30º/60º triangular pitch with 3.8%, 6% and 9.2% openness factors
- Manual or motorized operation
- Blind widths up to 490cm (16'1") and drops of up to 850cm (27'10") are possible
- Small stacking height, particularly with larger flexible slat sizes
- Robust construction, developed specifically for exterior installation

Key Benefits

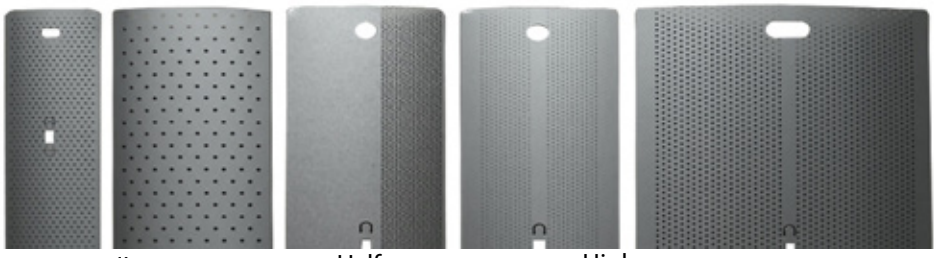
- System can be used on the interior, in a double façade or on the exterior
- Appropriate for all building orientations
- Fully retractable when not required
- Adjustable slat angles to prevent direct sun penetration, whatever the sun angle
- Daylighting options available—slats installed upside down

Key Benefits (continued)

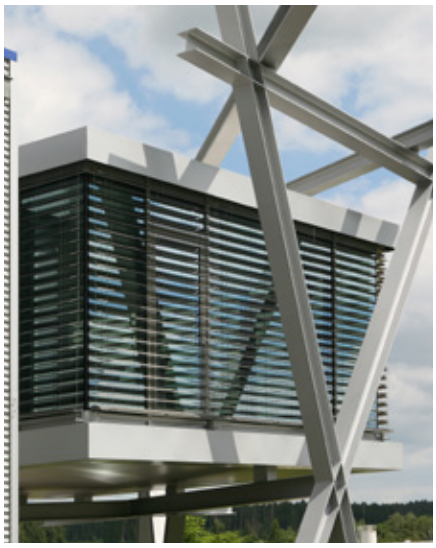
- Double Omega slat connection to the ladder braid reduces slat vibration in the wind
- Automatic controls available for optimum solar control, cutting solar gains by more that 90% and reducing HVAC requirements

Parameter/System Type	Omega	Omega L	Omega XL
Minimum Width: Manual	47cm / 18.5″	47cm / 18.5″	47cm / 18.5″
Minimum Width: Motorized	55cm / 21.5″	55cm / 21.5″	55cm / 21.5″
Maximum Width	500cm / 16′5″	490cm / 16′1″	490cm / 16′1″
Maximum Drop	720cm / 23′7″	370cm / 12′1″	850cm / 27′10″
Maximum Area - Manual	8.5m^2 / 91′^{2}	8.5m^2 / 91′^{2}	8.5m^2 / 91′^{2}
Maximum Area - Motorized D339	10.5m^2 / 113′^{2}	10.5m^2 / 113′^{2}	10.5m^2 / 113′^{2}
Maximum Area - Motorized D839	18m^2 / 193′^{2}	18m^2 / 193′^{2}	18m^2 / 193′^{2}
Maximum Wind Speed—Tilt To Open	30mph	30mph	30mph
Maximum Wind Speed—Retract	38mph	38mph	38mph

Slat Perforation Options

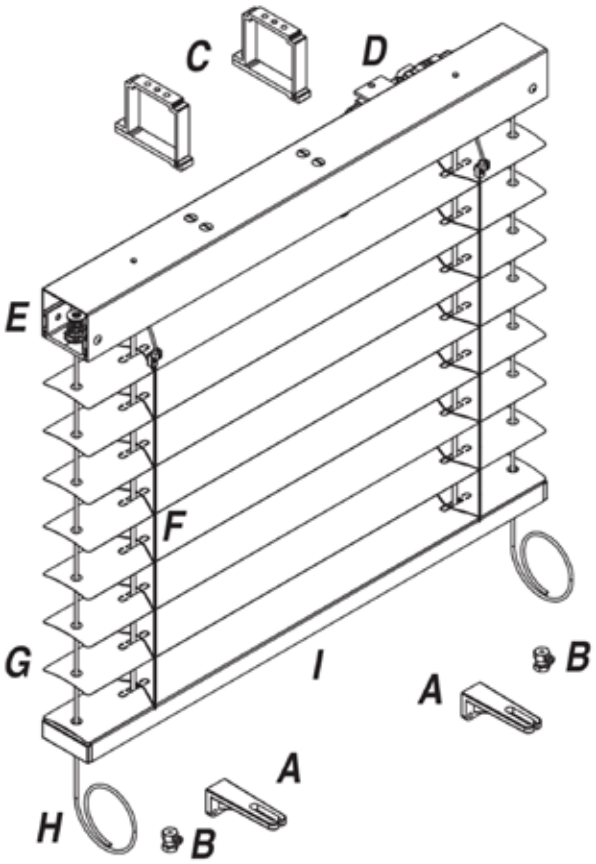


Full Half Highway



Omega™

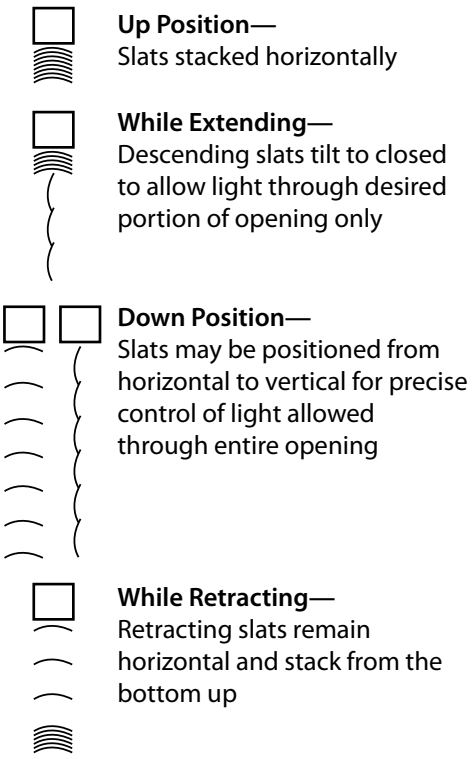
Omega Components



A—Tension Brackets (2)
B—Cable Tension Screws (2)
C—Swivel Brackets (2)
D—Motor/Disconnect Plug
E—Head Rail Assembly
F—Ladder and Lifting Tape (2)
G—Slats
H—Guiding Cables (2)
I—Bottom Rail

Please Note: The quantity of mounting brackets, ladders, lift tapes, and other items will vary depending on size of the unit. For wider blinds, an intermediate cable guide may also be provided.

Omega Slat Action/Positioning



Up Position—
Slats stacked horizontally

While Extending—
Descending slats tilt to closed to allow light through desired portion of opening only

Down Position—
Slats may be positioned from horizontal to vertical for precise control of light allowed through entire opening

While Retracting—
Retracting slats remain horizontal and stack from the bottom up

For our complete library of CAD files on this and other Solar Control Solutions products visit:
http://www.draperinc.com/SolarControlSolutions/CADfiles.aspx

FlexLouver™

The FlexLouver™ Rack Arm System is a non-retractable louver system. The louvers can open and close to control solar energy, light and glare. It is very beneficial when precise light control is important in venues such as galleries or museums. Each system incorporates standard components but is custom designed to meet the specific application requirements.

This reliable solution offers years of dependable service with minimal maintenance required. It is perfect for difficult glazing problems no matter the slope or angle of the window. The system can be used in just about any glazing situation: horizontal, inclined, vertical, or with any shape of window opening. The FlexLouver Rack Arm System can be used on interior or exterior windows.

Key Features

- Slats come in a wide range of sizes including:
  - 50mm ($1^{15}/_{16}$″) Flexible
  - 75mm ($2^{15}/_{16}$″) Extruded
  - 80mm ($3^{1}/_{8}$″) Rolled Edge
  - 88mm ($3^{3}/_{8}$″) Extruded
  - Other sizes possible depending on project requirements
- Perforated slats available with the 50mm and 80mm options
- Rack arm types: Standard, Heavy Duty and Box Rack Arm
- Range of rack arm profiles available to address different installation requirements

  Spans between fixing brackets:

Standard	225cm/88″ interior	150cm/59″ exterior
Heavy Duty	350cm/137″ interior	280cm/110″ exterior
Box	500cm/196″ interior	380cm/149″ exterior

- Slats are generally manufactured from aluminum but wood slat options are available
- Operation:
  - Manual (with gearbox and hand wheel or crank handle)
  - Motorized (standard with tubular motor and reduction gearbox, option Belimo motor where precise levels of light control are required)
- System widths up to 610cm/20′ and drops of up to 610cm/20′ possible, subject to maximum area constraints.
- Slats can be adjusted between fully opened and fully closed but do not retract.
- Robust construction, developed specifically for exterior installation.
- System can withstand very high wind speeds but care must be taken where there is a risk of significant ice or snow.

For our complete library of CAD files on this and other Solar Control Solutions products visit:
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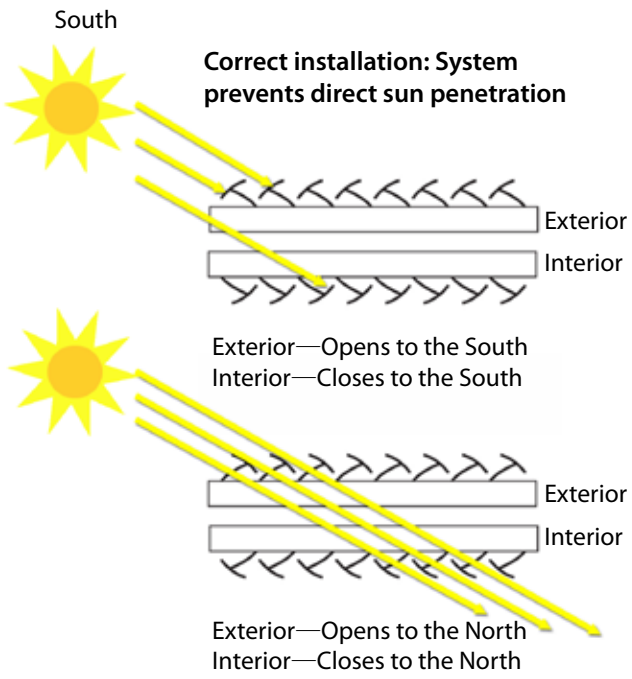
Key Benefits

- System can be used on the interior or on the exterior (depending on slat selection)
- System can be installed on vertical, horizontal or inclined glazing
- System can shade almost any shape of glazing-circle, triangle, trapezoid, etc.
- Adjustable slat angles to prevent direct sun penetration, whatever the sun angle
- Slow tilting of slat means that precise light control can be achieved
- High levels of light exclusion achievable with the extruded 88mm system
- Automatic controls available for optimum solar control, cutting solar gains by more than 90% and reducing HVAC requirements
- Precise light controls for hard to shade areas

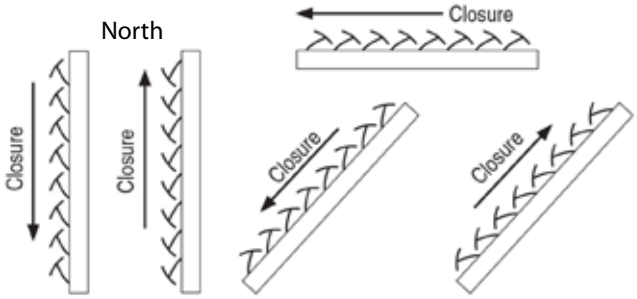
Parameter/System Type	**50A** (Flexible)	**75E and 88E** (Extruded)	**80R** (Rolled Edge)
Maximum Width: Interior	457.5cm / 15′	610cm / 20′	500cm / 16′4″
Maximum Width: Exterior	N/A	610cm / 20′	500cm / 16′4″
Maximum Drop: Interior	610cm / 20′	457.5cm / 15′	610cm / 20′
Maximum Drop: Exterior	N/A	457.5cm / 15′	500cm / 16′4″
Max. Span Between Rack Arms: Interior	90cm / 2′11″	140cm / 4′7″	140cm / 4′ 7″
Max. Span Between Rack Arms: Exterior	N/A	130cm / 4′2″	90cm / 2′ 11″
Maximum Area (Manual): Interior	12.5m^2 / 135′^{2}	20m^2 / 215′^{2}	20m^2 / 215′^{2}
Maximum Area (Manual): Exterior	N/A	12m^2 / 175′^{2}	20m^2 / 215′^{2}
Maximum Area (Motorized): Interior	20m^2 / 215′^{2}	24m^2 / 260′^{2}	24m^2 / 260′^{2}
Maximum Area (Motorized): Exterior	N/A	24m^2 / 260′^{2}	24m^2 / 260′^{2}

FlexLouver™

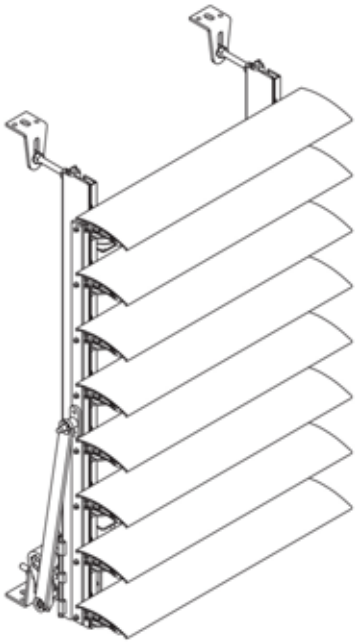
FlexLouver Direction of Closure

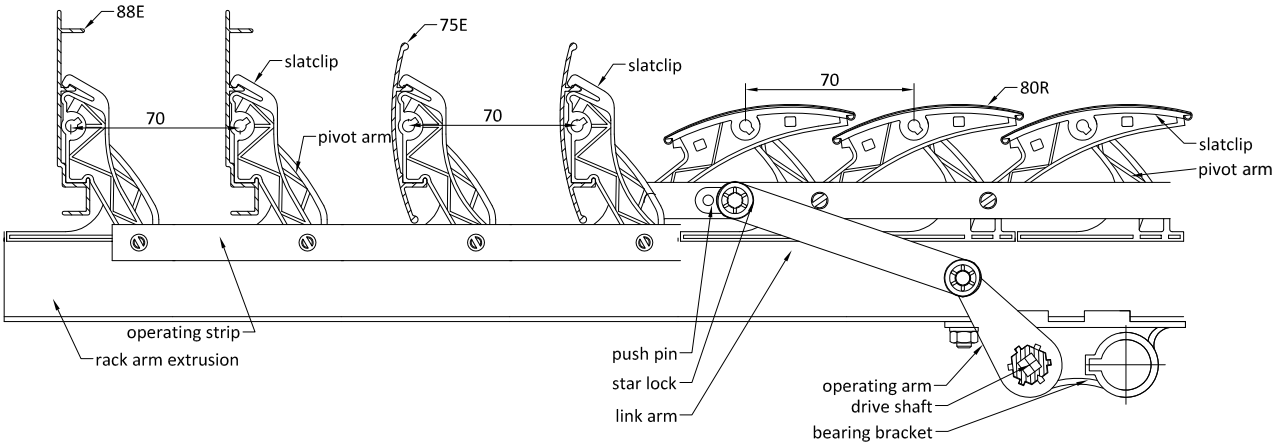


FlexLouver Position/Movement



FlexLouver System





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FlexShade ZIP™

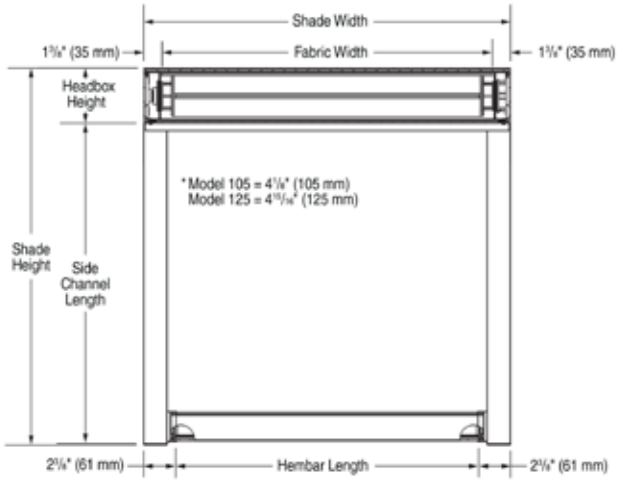
The FlexShade ZIP™ system is similar to a standard roller shade but incorporates a "zip" detail that is welded to the two vertical sides of the fabric panel. The zip edges of the fabric panel run inside inner channels in the side guide extrusions. These inner channels are held inside the side guide extrusion and have cushioning pads to dampen the movement of the fabric panel under wind load. The zip detail stops the fabric from being pulled out of the side guide and makes it very wind resistant.

Key Features

- Range of fabrics (mesh and black out) can be used with the system
- Two headboxes available depending on the system dimensions:
  - 105 system for smaller shades
  - 125 system for larger shades
- Motorized operation only
- Coupled systems, up to 3 panels, are available- but max width of system does not change
- Shade widths up to 192" and drops of up to 192" possible, subject to maximum area constraints
- Robust construction, developed specifically for exterior installation

Key Benefits

- System can be used on the interior or the exterior
- Appropriate for all building orientations – east, south, west and north
- Fully retractable when not required
- Narrow side guide profiles- 1¾"
- Zip detail on the edge of the fabric means that light gaps at the edge of the system are removed. System also effective as an insect screen
- System can withstand strong wind speeds and has been tested up to 145kph / 90mph. The system is warranted to this wind speed



- Automatic controls available for optimum solar control. Solar gains are significantly lowered (varies depending on fabric selection) and HVAC requirements reduced
- Easy installation, systems can be face or recess mounted

Parameter / System Types	105mm Headbox	125mm Headbox
Minimum Width	63cm / 24.875"	63cm / 24.875"
Maximum Width	400cm / 13'1"	500cm / 16'5"
Maximum Drop	350cm / 11'6"	500cm / 16'5"
Maximum Area	12m^2 / 129'^{2}	15m^2 / 161'^{2}
Maximum Wind Speed	145kph / 90mph	145kph / 90mph

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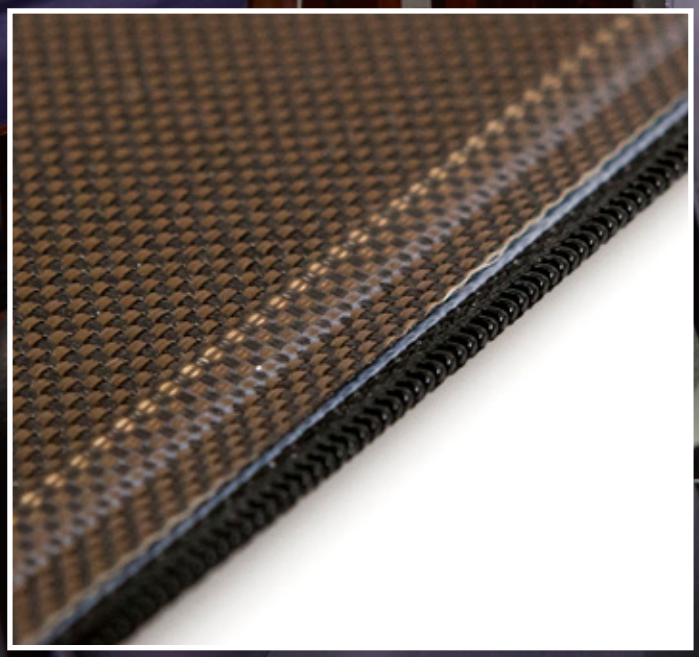


s_enn®

The s_enn® shading system is a unique exterior stainless steel shade with a very clean, modern architectural look. It has roll-formed rods welded onto stainless steel tapes that allow the panels to be rolled up like a standard roller shade. The hollow stainless steel sections are lightweight. The rods are placed to allow good view through while direct light is blocked when the sun is at an angle of 20 degrees or higher.

Very wind stable, the system has been tested in a wind tunnel at speeds of up to 80mph / 126kph with no damage so this system can go on the exterior of high rise buildings. The system is warranted in wind speeds of up to 56mph / 90kph, dependent on specific project details.

Key Features

- Retractable exterior shading system incorporating stainless steel strips to form the 'fabric'
- System operates like a roller shade and can be deployed and retracted as required
- System has two different side guide options – stainless steel rods or extruded aluminum profiles
- Standard systems can achieve a drop up to 280cm / 9' 2". Custom systems can have a drop of up to 600cm / 19' 8". The maximum width is 270cm/8'10"
- Standard systems can be supplied with round or rectangular extruded aluminum headbox profiles. Custom systems supplied with formed aluminum headboxes
- Robust construction, developed specifically for exterior installation. System can withstand very high wind speeds but care must be taken where there is a risk of significant ice and snow
- For coastal installations with potential exposure to higher salinity ask about Draper's s_enro® system which features aluminum instead of stainless steel construction. Call for details

Key Benefits

- System can be used on the interior or on the exterior
- System can be installed on vertical or inclined glazing. The system can operate on slopes up to approximately 10° from vertical
- System will block direct light for sun angles higher than 20° off horizon
- The system can withstand high wind speeds. It has been tested up to 126 kph / 78 mph and is warranted for wind speeds up to a maximum of 90kph / 56mph
- System provides a unique appearance
- Automatic controls available for optimum solar control, cutting solar gains by more than 90% and reducing HVAC requirements

Parameter / System Types	Type 70 Guide Rods		Type 71 Extruded Guides	
	Standard	Custom	Standard	Custom
Minimum Width	62cm / 24"	62cm / 24"	62cm / 24"	62cm / 24"
Maximum Width	270cm / 8'10"	270cm / 8'10"	270cm / 8'10"	270cm / 8'10"
Maximum Drop	280cm / 9'2"	400cm / 13'1"	280cm / 9'2"	600cm / 19'8"
Maximum Area	N/A	$10m^2/107'^2$	N/A	$14m^2/150'^2$

s_onro®

s_onro® is an exterior roller shutter system made of aluminum slats that are designed to cut out the sun and provide privacy but still allow light and air into the room as needed. This clean, modern look has an architectural feel. The individual profiled slats are roll-formed from aluminum and have interlocking tabs that connect them together.

As the screen descends into place you control the openness by stopping the descent. The bottom-up closing of the system allows you to have privacy by closing the lower part of the system while leaving the top open to the light. Glare control is automatic since direct penetration of the sun's rays is cut out once the sun rises more than 20 degrees above the horizon. The system can be completely closed for total privacy and light exclusion as well.

Key Features

- Retractable exterior shading / daylighting shutter system incorporating aluminum slats to form the 'fabric'
- System operates like a roller shade and can be deployed and retracted as required
- Described as daylighting because when extended, the system has spacing between the slats. This spacing can be eliminated starting from the bottom-up with further deployment
- System incorporates extruded aluminum side guide channels and a sill angle
- System can be supplied with an integrated fly screen
- System can be supplied with five different extruded aluminum headbox options including round and rectangular. Robust construction, developed specifically for exterior installation. System can withstand very high wind speeds but care must be taken where there is a risk of significant ice and snow

Key Benefits

- System can be used as a sun shade allowing vision to the exterior
- System provides complete shade for sun angles of 20° or more
- System, when fully closed, can provide almost complete black out and nearly water tight
- System can be used as a security screen. It is, however, manufactured from aluminum, not from steel
- The system can withstand high wind speeds and is warranted for wind speeds up to a maximum of 90kph / 56mph
- System has a well engineered architectural appearance when compared to competitive systems
- System available in four standard slat colors, custom colors also available

Parameter / System Type	Dimensions
Minimum Width	60cm / 24"
Maximum Width	240cm / 7'10"
Maximum Drop	245cm / 8'
Maximum Area	$6m^2$ / $64'^2$
Maximum Wind Speed	90kph / 56mph

Topspin®

Key Features

- Retractable exterior shading system that is made up of a series of fabric panels and can shade large areas of glazing
- Fabric panels are installed onto spring loaded roller tubes that provide regular intervals of support to the fabric
- System can be installed on horizontal, sloped, vertical and curved glazing. System can be installed on surfaces which slope in two directions
- System widths up to 315cm / 10'4". Systems can also be coupled
- System lengths up to 1300cm / 42' 6" are possible, longer depending on application
- System can withstand wind speeds up to 38 mph
- System uses exterior rated mesh fabrics

Key Benefits

- System can be used as a sun shade allowing vision to the exterior
- System may be installed on exterior or interior
- Spring roller supports every 3-5 ft.
- Lightweight—Installs to brackets which offset product from mounting structure. Easily place stack outside of window area on roof
- Radius can be as tight as 1 meter radius
- System has a well engineered architectural appearance when compared to competitive systems
- System available in four hardware colors- RAL 7016, 9001, 9010, 9006
- Custom colors available for an additional charge

System Parameters

System stack, in cm, is calculated as:

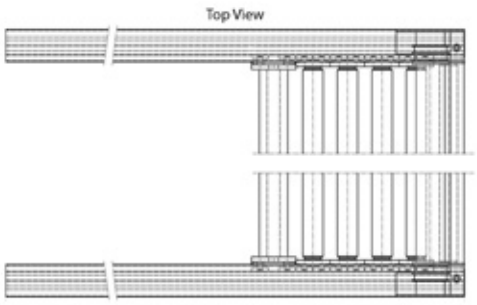
Flat Systems

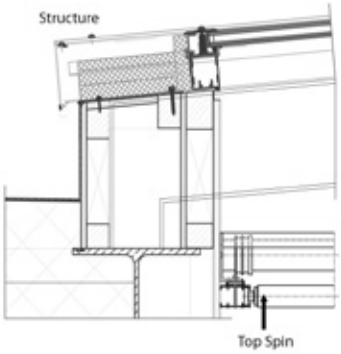
((Total Draw (cm)/150)** +2) * 8cm = stack

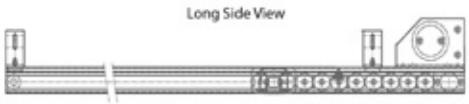
Curved Systems

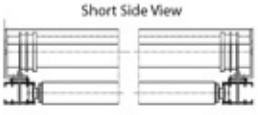
((Total Draw (cm)/80)**+2) * 8cm= stack

*** should be rounded up to a whole number*










900 cm

FlexWave Light Shelf™

The FlexWave Light Shelf™ is an architectural element that allows light to penetrate deeper into a room. This horizontal shelf is placed above eye-level and is used to reflect light onto the ceiling, bringing light deeper into the space. This distribution of light reduces "hot spots" and allows a deeper penetration of glare-free natural light. Top surface is made of highly reflective aluminum sheet. Front cap and bottom are also composed of aluminum and available in black, white or silver.

Balancing daylight and artificial light by using dimming controls and solar control systems that include the FlexWave Light Shelf can significantly reduce the energy consumption of light fixtures and HVAC.

Dimming fixtures by as much as 50% may be barely noticeable to building occupants, unless they are involved in tasks that require visual acuity, but can save on the use of electric lighting sources.

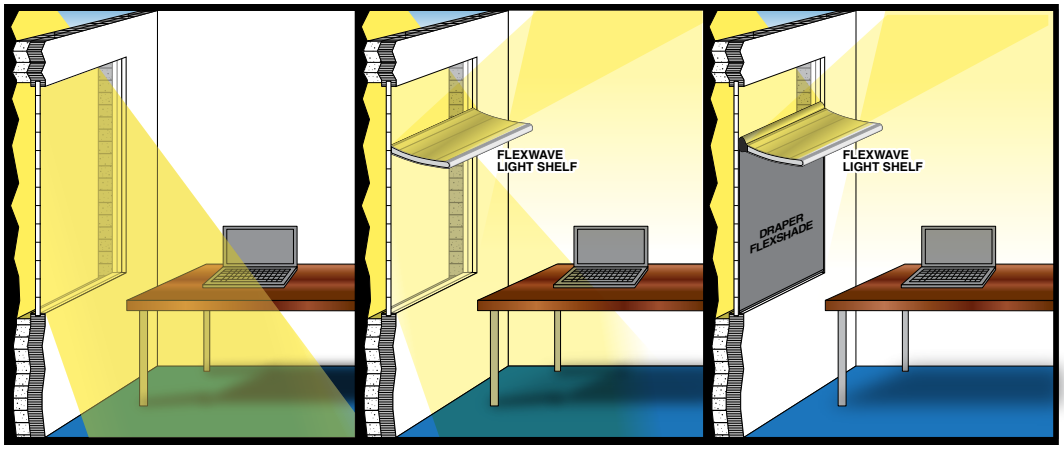
Key Features

- Shelf can be easily rotated down, without the use of tools, for cleaning
- Lightweight constructions. Quick and easy install
- Brackets available to allow roller shade integration
- Can be used with bottom-up shade

Key Benefits

- Designed to reduce the need for artificial lighting in buildings
- Can be installed in single sections or continuous runs
- In spaces such as classrooms and offices, light shelves have been designed to increase occupant productivity, health, and reduction of employee absenteeism
- Incorporating light shelves in a building design is admissible for the LEED point system, falling under the "Indoor Environment Quality: Daylight & Views" category

Parameter / System Types	105mm Headbox
Minimum Width	46cm / 18"
Maximum Width	213cm / 84"



Custom Shading Solutions

Many projects have unique architectural requirements which mean that a standard shading system might not be appropriate. By working closely with the design team, Draper can provide input into the design process in order to develop systems that meet the specific project needs. This input might range from the development of custom brackets that address a specific situation to the development of a new product to provide the required shading performance while meeting the architect's design intent.

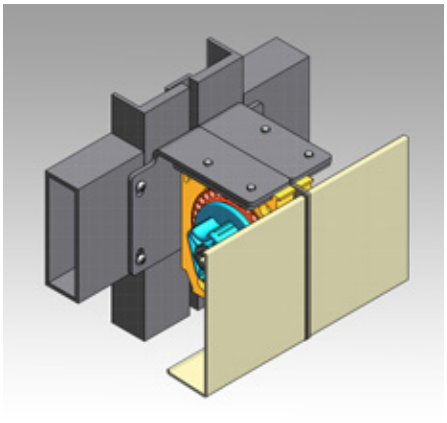
As part of the design process, Draper can undertake a shading analysis to look at the performance of the proposed shading systems, produce 3D print models of components and look at the integration of systems into the building façade. Draper can also look at lead times and costs, controls and electrical wiring requirements and develop specifications for the proposed systems.

Key Capabilities

- 3 options available –
  1. Modification of an existing system
  2. Source appropriate systems from a large number of global partners that Draper works with
  3. Development of a custom system to meet the project requirements
- In –house equipment and capabilities to form custom head boxes and louvers, incorporating cut-outs, and design features as appropriate
- Design and manufacture of custom brackets to meet specific project requirements, deflection rollers, systems for sloped glazing
- Custom systems for non-regular shaped windows
- Custom clutches for manual roller shades
- 3D printed samples of components for review and approval
- Shading analysis
- Drawings, budgets and specifications

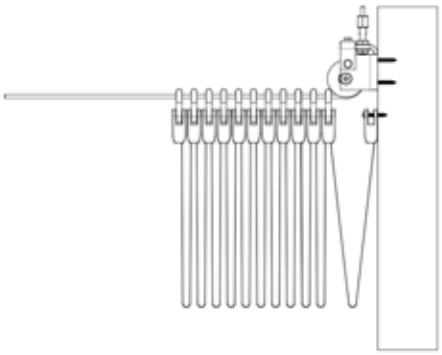
Key Benefits

- Workable and cost effective solutions to address the architectural requirements
- Responsive input throughout the design process
- Involvement of dealers, installers and partners within the shading industry to provide effective and appropriate input



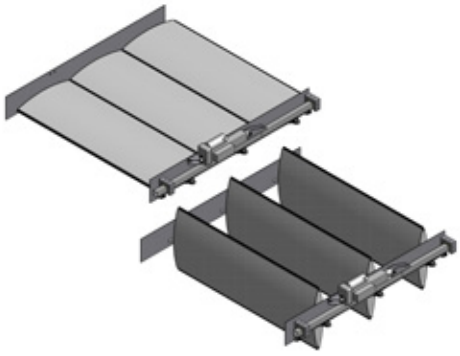
Modification of an Existing System

When presented with unique jobsite conditions, Draper can develop custom features to work with its current product offering. These features might be: custom brackets to attach to structure differently, custom pockets to work within size limitations, re-directional rollers to drop fabric at a constant location, and more. Draper will provide drawings, 3D prints and prototypes as needed to help assist in providing a solution. Small projects or big projects we want to help.



Products from Draper's Global Partners

Draper has a wide range of products and the ability to create products for your project. In some cases, however, the best option might be a product supplied by a global partner. Draper works with manufacturers around the globe, and if one of our partners has a solution that is right for your project. We will provide project documentation on the product and assist in providing it. The warranty and support of the product will be handled by Draper so the standards you expect are met.



Custom Systems to Meet Project Requirements

Many projects today have unique window conditions or a client with an out of the box idea, Draper is here to assist in these project. With Draper's ability to manufacturer unique products, we want to see the obstacles that you face. We will work with you to design and create a solution that fits your one of a kind situation. Drawings, 3D prints, prototypes, and meetings are all part of the process in designing a solution for you.

Solar Control Solutions by Draper is all about providing you with the high quality systems to meet your project needs. We will discuss any project with you, and we will do our best to fit a solution to your budget and timeframe. We appreciate your business and look forward to working with you on your next project.

Controls

To achieve optimum solar control. It's important that shading systems respond to the sun conditions. To achieve this, Draper is able to offer automated sun tracking controls such as the SolarFlex system. The SolarFlex control system allows shading systems to be deployed, retracted and tilted (if appropriate) to provide optimum solar control – allowing maximum use of natural daylight while preventing glare and excessive heat gain.

SolarFlex is an automated system designed to maximize the availability of natural daylight while providing thermal comfort for the building occupants. SolarFlex's sun tracking software, combined with exterior sensors, means that the shading system is periodically adjusted to prevent direct sun penetration and glare while allowing as much ambient daylight into the building as possible. The system is programmed with the location of the building and the orientation of the glazing and, based on the time of the day and day of the year, will then deploy the shading systems as appropriate. On cloudy days and when there is no sun on the glazing, the shading systems will remain retracted allowing natural daylight to enter the space and preserving views to the exterior.

Why SolarFlex?

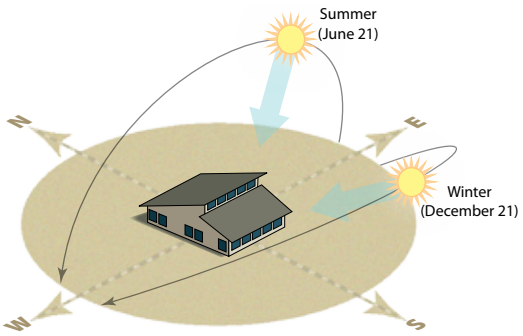
As highlighted above, the SolarFlex system will maintain a comfortable work environment by deploying and adjusting the shading system to address glare and solar heat gain. Benefits that can arise include –

- Capital savings through a reduction in the size of the HVAC system
- On-going cost savings as a result of the smaller HVAC system
- Improved use of natural daylight. If the shading system is used in conjunction with intelligent light systems, significant cost savings can be achieved
- Increased productivity

Flexibility of Control

SolarFlex provides flexible control to meet specific user requirements. SolarFlex is BACnet compatible allowing integration with most Building Management Systems. The system also integrates with lighting and Audio Visual control systems through dry contacts or an RS 232 or RS 485 interface.

Manual override can be achieved through re-configurable switches or a computer interface and the optional Building Manager software provides a graphical user interface that allows facilities management to get an overview of the shading systems in the building, override shades, modify some of the control parameters, schedule operations on a daily, weekly, monthly or annual basis and generate reports.



Quality & Innovation Since 1902

Established in 1902 as a manufacturer of window shades for schools, Draper now offers three major product lines in addition to our FlexShade Systems: projection screens and related audio-visual equipment (CSI section 11 52 13); lifts for video projectors and flat panel displays (CSI section 11 52 00); and gymnasium equipment, featuring the EZ Fold basketball backstop (CSI section 11 66 00).

Please visit us at ***www.draperinc.com*** to download specifications, CAD details, submittals and installation instructions. To receive additional printed or electronic literature, contact Draper by calling, faxing or e-mailing.

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