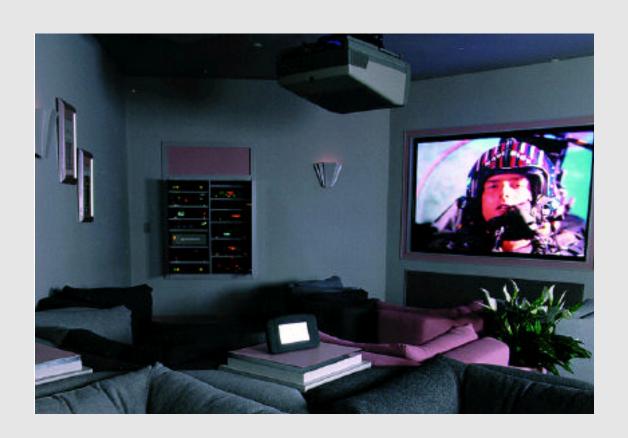


## Types of Home Theater Projection Screens





# CinemaSource, 18 Denbow Rd., Durham, NH 03824 www.cinemasource.com

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#### **SCREEN MANUFACTURERS PROFILED IN THIS GUIDE:**

DA-LITE SCREEN, 3100 North Detroit St., Warsaw, IN 46581 800-622-3737, www.da-lite.com

DRAPER, 411 S. Pearl St., Spiceland, IN 47385 800-238-7999, www.draperinc.com

VUTEC Corporation, 5900 Stirling Road, Hollywood, FL 33021 800-770-4700, www.vutec.com

STEWART FILMSCREEN, 1161 West Sepulveda Blvd., Torrance, CA 90502 800-762-4999, www.stewartfilm.com



## CHAPTER One: Types of Front Projection Screens

and gain projection screen going into a home theater, or other display application, is made without a great deal of thought. This is unfortunate because the projection screen is a critically important element in a video display system. It is no less than the final link in the picture deliver process and the visual focus of the entire room. Furthermore, we have seen the quality of many home theater rooms compromised because of casual and thus improper screen selection. Before you choose one, we recommend spending some time reading this design guide and getting a feel for how different screen features affect the image you see.

#### Types Of Front Projection Screens Available

High gain curved screens consist of reflective foil surfaces mounted on large curved plastic backings. Sold by Vutec under the Ultra-High Gain Curved Screen brand name, these screens offer gains of over 13 and display ultra-bright, ultra-high contrast images. Although curved screens were mandatory several decades ago when video projectors offered much less light output than today, they are still a very popular option for use in rooms with high ambient light levels. The reason concerns the physical behavior of the curved surface itself. Because they are designed to direct the major portion of the projected image back into a reduced viewing cone, they are equally adept at rejecting room lighting off to the sides. In other words, design your room with lights and windows off to the sides (i.e. not directly opposite the screen), and with a curved screen you will get a bright, high contrast image, much higher than if you used a flat screen.

Curved screens weigh very little, are easy to install and can be easily cleaned. Historical note: In the old days curved screens were made of Kodak Ektilite, an uncoated aluminum material that could not be cleaned. To this day some people still worry that curved screens "can't be touched". Today's curved screens are completely washable.

We recommend that you consider a curved screen if you anticipate having a substantial amount of light in the room from windows, inside lights, etc. Often they are the only solution for getting a high quality front projected image in a room of this type.

Front-projected fixed flat screens are one of the most common ways to view projected video images. In home theaters they are exceedingly popular because they closely resemble their counterparts in commercial theaters. Fixed flat screens typically consist of a vinyl screen material with Velcro or snaps on the edges which is stretched across an extruded aluminum frame coated with a flat black epoxy finish. These screens are not only very easy to install, they are quite affordable and are available in 4:3, 16:9 and other aspect ratios.

Keep in mind that flat screens are very sensitive to light in the room, thus flat screens tend to look best in dark rooms. If you can control the room lighting, (i.e. with drapes, blinds and light dimmers) then flat screens are an excellent screen choice. Note: a new option for fixed flat screens is a black velvet finish applied to the frame. This finish is very handsome and eliminates the glare of the video image overscanning the active picture area.

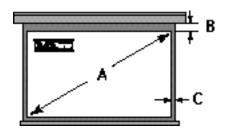
If your want your projection surface to retract when not in use, consider a **front-projected manual retractable screen.** These screens operate similar to window shades. You pull them down for use and let them roll up when the show is over. Manual retractable screens are very affordable, are available in 4:3, 16:9 and other aspect ratios with a matte-white screen material. The screen housings can typically be ordered in black, white or gray colors at no extra charge.

An important feature that every home theater designer will appreciate is Vutec's unique screen mounting system. As illustrated on page 46, this feature is standard on Vutec's manual retractable and several of the motorized retractable screens. The secret of this mounting system is a simple channel that runs the entire length of the screen.





#### How Screens Are Measured



A = Screen Size Diagonal
B = Black Leader (on rolldown
flat screens) typically adjustable
from 2" to 8"

C = Black Borders, typically 1" on Curved Screens, 2" Flat Screens

It allows the screen mounting clips to be placed almost anywhere behind the screen, or above the screen. The beauty of this system is that one does not have to fabricate anything to hang the screen from. The clips are simply attached to supporting studs behind, or above, and can be spaced "roughly" on the right and left sides of the screen. In the old days, installing a screen via the mounting tabs on the housing ends could take several hours. Floating Mounting Brackets makes a screen installation just a 5-10 minute job and often requires just one person.

For those that want the luxury of automation, consider a front-projected motorized rolldown screen. These screens are powered by a 120 or 220VAC power source and can be lowered and raised via a switch. Many home theater installers go a step further, and wire them to a relay that automatically lowers the screen when the system is turned on. Another control method is to interface the relay with an Infrared controller so that the screen can be controlled via a hand held remote control. These methods and several others are covered in Chapter 8 of this handbook. Offered under various brand names, standard motorized screens are available in 4:3, 16:9 and other aspect ratios with materials that range in gain from .85 to 3.1. Trap door versions are also available.

For those who want a very flat surface but in a motorized format, Vutec manufacturers a "tab-tensioned" motorized rolldown screen line. These screens sport external suspension cables that pull the screen surface taut thus eliminating screen wrinkles and edge curl. Tab tensioned screens are more expensive than their free hanging counterparts but offer an extremely flat surface in a motorized housing. Tab-tensioned motorized screens are available in 4:3, 16:9 and other aspect ratios with

materials than range from .9 to 3.0 gain.

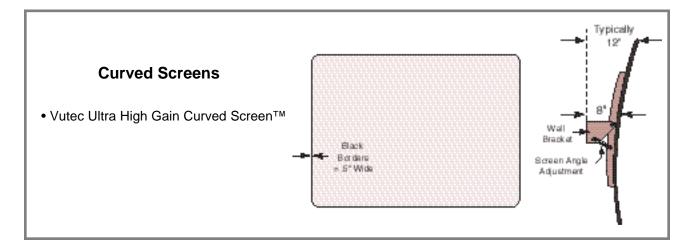
Often consumers demand "unobtrusive" equipment in their home theater rooms, in or other presentation environments. In other words, they don't want to see the technology that creates the A/V experience anymore than what is absolutely necessary. If you think about it, this is really extreme. When you watch a movie at a commercial theater all you see is a big picture and sound. No speakers, no projectors, no blinking lights, etc, just the pure movie experience. Well for those who want to hide the technology, Vutec offers several models. All four of the screen manufacturers offer Motorized Trap Door Screens. These are assemblies that are designed to mount in the ceiling. As the diagrams on the following pages show, there actually is a trap door system that retracts flush with the ceiling when the screen is raised. The housing itself is made of a high density composite wood material and the doors are available primed for paint or in a custom laminate for a extra charge.

#### **Rear Projection Screens**

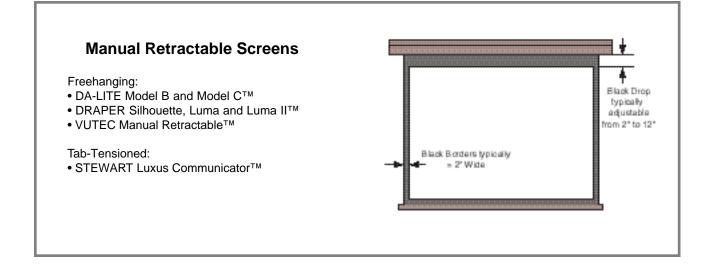
When you go to your local A/V retailer and look at televisions in the 50 to 80" range, you are looking at rear screen projection systems. The pictures on these are generally bright, high contrast and can be easily seen in well lit rooms. Those who are looking for this kind of performance in larger screen sizes should consider a custom-built rear screen system. These systems are typically built into the wall of a home theater room, or board room, and can offer outstanding performance. We cover these systems in another of our CinemaSource Design Guides.







#### Stretched Flat Screens Screen surface Standard with 1.5" Frame: is attached via STEWART Luxus Screenwall™ vieloro or en aps. Standard Frame to the back. DA-LITE Permwall and Da-Snap™ Width Typically of the DRAPER CinePerm™ = 1.5°Wide Delaxe Frame aluminum frame VUTEC Vu-Easy™ Width Typically = 8.25° Wide Deluxe with 3.25" Frame: Frame optionally STEWART Deluxe Luxus Screenwall™ available with DA-LITE CinemaContour™ Black Velvet finish DRAPER Shadow Box Clarion™ VUTEC Vision XWF™

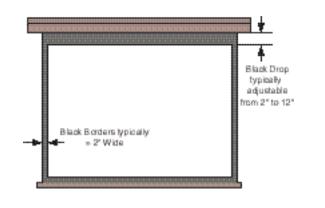






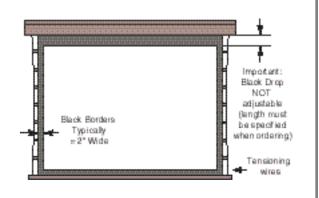
# Electric Motorized Free Hanging Screens

- DA-LITE Cosmopolitan Electrol™
- DRAPER Targa<sup>™</sup>
- VUTEC Vision XL and Lectric 1™



#### Electric Motorized Tab-Tensioned Screens

- STEWART Luxus SR-1
- STEWART Model A ElectricScreen™
- DA-LITE Tensioned Cosmopolitan Electrol™
- DRAPER Artisan/Series V<sup>™</sup>
- VUTEC Lectric III™

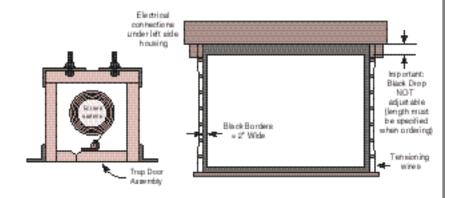


# Motorized Trap Door Screens • DA-LITE Director Electrol<sup>TM</sup> • DRAPER Signature Series E<sup>TM</sup> • VUTEC Lectric III<sup>TM</sup> • Trap Door Assembly





#### Tab Tensioned, Trap Door Screens

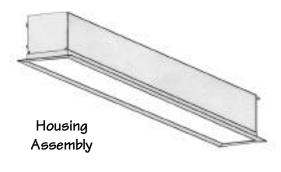


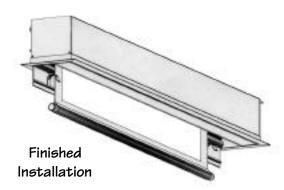
- STEWART Stealth Trapdoor™
- DA-LITE Tensioned Director Electrol™
- DRAPER Signature and Ultimate Access/ Series V™
- VUTEC Lectric IV™

#### Motorized Screens with Pre-Installation Kits

These screens are designed for two part installation.

The Housing assembly can be mounted after the structure framing is completed. Once the drywall is finished and painted, the rest of the screen assembly can be installed.





- STEWART Visionary ElectricScreen™
- DA-LITE Advantage Electrol™
- DRAPER Ultimate Access™
- VUTEC Vision XTC™



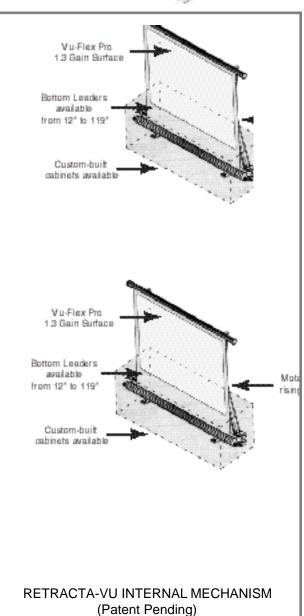




n many installations, the performance of a front projected screen is desired but there simply isn't any place to "hang" a screen. The Vutec Retracta-Vu Pro and VISION RX retractable projection screens are perfect solutions for situations such as this. This motorized rising arm screen assembly fits in a box 10" square when fully retracted and features a tilting keystone correction adjustment when extended. The screen surface used in the Retracta-Vu model is the Vu-Flex Pro 1.3 gain material. The Vision RX can be ordered with any of VUTECs screen materials. Contact the company for quotes on custom handcrafted cabinets that contain the entire Retracta-Vu/Vision RX











# CHAPTER TWO: Front Projection Screen Materials



#### Stewart Screen Surfaces

#### **GRAYHAWK**

GrayHawk is a innovative new front projection screen material solely designed and engineered to maximize "Image Fidelity" for LCD, DLP and D-ILA projection technologies. GrayHawk increases image black levels, shadow detailing and overall color saturation providing the viewer with a more film like experience. Gain: .95, Viewing Angle: 160 Degrees

GAIN = .95

#### STUDIOTEK 130

Studiotek 130 is generally used with high output broadcast quality projection systems to produce images to the strictest color and white field uniformity standards. This material is over 30% brighter than standard matte white surface materials. It was developed under the direction of Joe Kane and certified by the Imaging Science Foundation. Gain: 1.3, Viewing Angle: 160 Degrees

GAIN = 1.3

#### **ULTRAMATTE 150**

This screen fabric combines the qualities of Studiotek 130 and the higher gain of Videomatte 200. This material is over 50% brighter than standard matte white surface materials. It is a great choice for projectors that employ line doublers and even HDTV images. This is the same screen material that most commercial movie theaters use! Gain: 1.5, Viewing Angle: 140 Degrees

GAIN = 1.5

#### **VIDEOMATTE 200**

This screen is color-corrected for CRT video projectors and also works well with LCD/DLP and film projectors. This material is over 80% brighter than standard matte white surface materials. This is a moderate gain screen with high reflective qualities that still maintains good off axis viewing. Since it is more reflective, it works harder to brighten up the image. The screen is almost twice as bright as ordinary matte screens and is an excellent choice for installations featuring smaller projectors or when very large image sizes are desired. It is also an excellent choice for D-ILA projectors. Gain: 1.8, Viewing Angle: 120 Degrees

GAIN = 1.8







#### **DA-LITE Screen Surfaces**

#### **DA-MAT HIGH CONTRAST**

A smooth, gray, vinyl finish surface for high output LCD/DLP/D-ILA projectors. This surface improves contrast by lowering black levels. It is a highly flexible unsupported vinyl fabric and may be folded or rolled. It is available on all models offerred with Da-Mat. Viewing Cone: 40°, Gain: .8

GAIN = .8

#### **DA-MAT**

A smooth, white, vinyl finish surface for precise image reproduction. Provides an exceptionally wide angle of view with little loss of resolution. It is a highly flexible unsupported vinyl fabric and may be folded or rolled.

GAIN = 1.1

Viewing Cone: 50°, Gain: 1.1

#### **MATTE WHITE**

The most versatile screen surface and the premier choice when ambient light is controllable. It evenly distributes light over a wide viewing area while colors remain bright and life-like, with no shifts in hue.

GAIN = 1.1

Viewing Cone: 50°, Gain: 1.1

#### **CINEMAVISION**

A unique unsupported vinyl surface that offers a bright, uniform image with no color shift no matter at what angle you view the image. Viewing Cone: 45°, Gain: 1.3

GAIN = 1.3

#### **VIDEOSPECTRA**

Especially designed for demanding video and overhead LCD projection applications where a balance of higher gain and greater viewing angle is required. The special pearlescent surface may be cleaned with mild soap and water.

GAIN = 1.5

Viewing Cone: 35°, Gain: 1.5

#### **HIGH POWER**

A technological breakthrough, combines the reflectivity of a glass beaded surface with the ability to clean the surface when required. Its smooth surface offers the highest gain of all types of screen surfaces with moderate viewing angle.

GAIN = 2.8

Viewing Cone: 25°, Gain: 2.8







#### **VUTEC Screen Surfaces**

#### **SOUND SCREEN**

This acoustically transparent material leads the industry in sound clarity. It is not a vinyl material punched with holes, it is a loose weave, acoustically transparent fiberglass similar to speaker grille material. Because of it's superior construction, it can hang free eliminating the need for tab-tensioning and is durable enough for almost any home theater application.

GAIN = .85

#### **MATTE WHITE**

This material consists of a pure white, fiberglass-reinforced vinyl fabric with a black-out backing. Because it's a free hanging characteristics, it does not require a tab-tensioning mechanism and thus provides excellent performance at a reasonable cost.

GAIN = 1.0

#### **VU-FLEX PRO**

This heavy weight material (36 Oz/Sq. Ft.) offers a gain of 1.3 and is designed to hang flat without any tab-tensioning mechanism. Because of it's 1.3 gain specification, this material is a favorite with installers who are designing for optimum video display performance.

GAIN = 1.3

#### **BRITE WHITE**

Vutec's Brite White fabric offers a gain of 1.5 and is a favorite for CRT-based display applications. The secret of it's performance is a reflective coating that adds brightness without introducing any hotspotting. This high performance material does require tabtensioning in roll-down configurations.

GAIN = 1.5

#### **PEARLBRITE**

With a gain of 3.1, this material is the brightest flat screen material available from Vutec. Because of it's high performance characteristics, this material does require tab-tensioning in roll down configurations. In general, this material is the best surface to use for solid state imaging devices, i.e. LCD, DLP, DILA, etc. It does not suffer from hotspotting when used with single-lens imaging devices such as these.

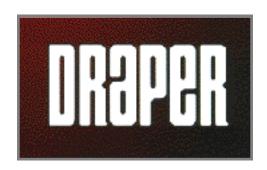
GAIN = 3.1

#### **ULTRA HIGH GAIN ALUMINUM FOIL**

Used on all models of Vutec's Ultra-High Gain Curved Screen line, this material has been carefully developed and improved over many years to achieve not only a maximum gain of 13.2 on-axis, but to maximize the breath of viewing area. It is truely the world's brightest front view screen material and is an excellent choice when dealing with high ambient light conditions.

GAIN = 13.2





#### **DRAPER Screen Surfaces**

#### **FIBERGLASS MATT WHITE**

Matt white consists of a matt white vinyl reflective surface laminated to a rugged woven fiberglass base. This base textile provides superior "lay flat" characteristics and tear resistance. Fiberglass matt white provides a 180 degree viewing cone and requires no tensioning. Perfect for any room with controlled ambient light.

GAIN = 1.0

#### AT1200

AT1200, a Draper exclusive, is the most innovative and versatile acoustically transparent front projection screen material available. This revolutionary advance for home theatres allows the viewer (and listener) to position the center channel speaker directly behind the screen. With over 76,000 microscopic openings per square foot, AT1200 has the sound transmission characteristics of high quality speaker grille cloth. AT1200 provides a uniform gain matt white surface slightly superior to the standard one-gain material.

GAIN = 1.2

#### M1300

M1300 is the perfect matt white diffusing front projection surface, offering good reflectivity, a panoramic 180° viewing cone and true color rendition, with no hot spots or color shift. Used on tab tensioned electric or permanently tensioned screens, this unsupported vinyl material is recommended for any type of projection in rooms where the light level can be reasonably controlled. In a dedicated home theatre this surface provides the logical choice. M1300 features 1.3 gain and is washable.

GAIN = 1.3

#### M2500

M2500 is a unique, unsupported vinyl material that serves as our flagship front projection viewing surface in the home theatre market. The combination of superior reflectivity with a vastly improved contrast capability provides spectacular results—images which are both significantly brighter and richer in color contrast. Developed for use with CRT and LCD video projectors, M2500 will tolerate a much higher ambient light level in the home theatre than any other front projection surface. Perfect for those integrating the home theatre into an existing space such as a family room. M2500 has an on-axis gain of 2.5, outstanding black retention, accurate light colors and whites, with a viewing cone of up to 180°. Available on all Draper permanently tensioned and tab tensioned electric screen models. M2500 is ideal for any home theatre application.

GAIN = 2.5





### CHAPTER TEN: Screen Terminology Glossary

**Ambient Light:** The light in a viewing room produced by sources other than the screen

**Aspect Ratio:** The numeric relationship between a screen's height and width. Generally speaking an aspect ratio defines a "shape".

**Black Drop:** On a rolldown flat screen this is the area that is black on the top or bottom of the picture areas.

**Brightness:** A viewer's subjective response to a display's luminance

**Contrast ratio**: The numeric relationship between the brightest and darkest portions of a video display. It is generally expressed in foot-lamberts as a ratio of max/min.

**CRT:** Cathode ray tube, a vacuum tube where electrons are drawn to phosphor targets via high voltage potentials. This is the technology behind standard "picture" tube-type televisions.

**DLP:** Digital light processor, a technology based on the Texas Instruments DMD micromirror imaging chips. These chips have a field of reflecting mirrors that can be modulated to produce video images.

**Foot-Lambert:** A unit of luminance equivalent to 1 lumen per square foot.

**Fresnel Lens:** A device constructed of a large number of closely spaced concentric circles cut into an optical surface. The circles are cut so that they reduce the incident bend angles of the projection source and collomate the light into one beam.

**Gain:** A measurement of the amount of light radiating perpendicularly from a screen. Unity gain (a gain of 1) is generally standardized via a block of magnesium carbonate.

**LCD:** Liquid Crystal Display, a technology of video display that uses liquid crystal "shutters" to modulated the light passing through the imaging chips. Also refered to as "Transmissive LCD technology".

**Lens Speed:** The ability of a lens to pass light. Expressed in a ratio, it is the focal length of the lens divided by the effective diameter of the lens. A fast lens passes more light and gets a lower rating.

**Lumen:** The quantity of visible light falling on a 1 square foot surface of a sphere 1 foot in radius as radiated by a source of 1 standard candle. This specification is often used to rate the light output of video projectors. Look for ANSI lumen ratings, it is a standardized measurement.

**Luminance:** The brightness of a light source measured in foot-lamberts.

**Pixel:** A picture element. On digital devices, images are usually constructed of pixels fields divided into rows and columns.

**Resolution:** The limit of a display's ability to present fine detail. "Optical resolution" is usually the number of lines seen, "video resolution" is usually the number of "line pairs" seen.

**Scan Lines:** A CRT-based video display creates images by rapidly sweeping electron beam across a phosphor target. As these lines are swept from top to bottom they create scan lines.

**Throw Distance:** The distance from the screen surface to a video display device. This is an important number used in the installation of a video display.

**Viewing Angle:** An angle that specifys a particular viewing location measured from a perpendicular from the screen surface.

# 15

# NOTES: