

A Commercial Grower's Roadmap to
GREENHOUSE COVERING SELECTION

WHITE PAPER BY

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BUYER BEWARE: NOT ALL GREENHOUSE COVERINGS ARE CREATED EQUAL

With the extensive selection of greenhouse covering (a.k.a., glazing) materials available, it is easy to feel as if you are lost in a sea of choices with no guiding compass. Think of this guide as the navigator pointing you in the right direction to make a well-informed decision when you select your greenhouse covering.

Given the primary purpose of a greenhouse involves harnessing sunlight — with transparent material making up nearly 90% of the structure to achieve this end — it stands to reason one would want to select the very best covering material available for efficient production that maximizes plant growth.

We're often asked what type of greenhouse covering (a.k.a., greenhouse glazing) commercial growers use most frequently. The answer is polyethylene film, which experts estimate covers 95% of the world's commercial greenhouses (Jacobson, 2021, p. 30). A better question to ask, however, is what is the right greenhouse covering for my growing needs?

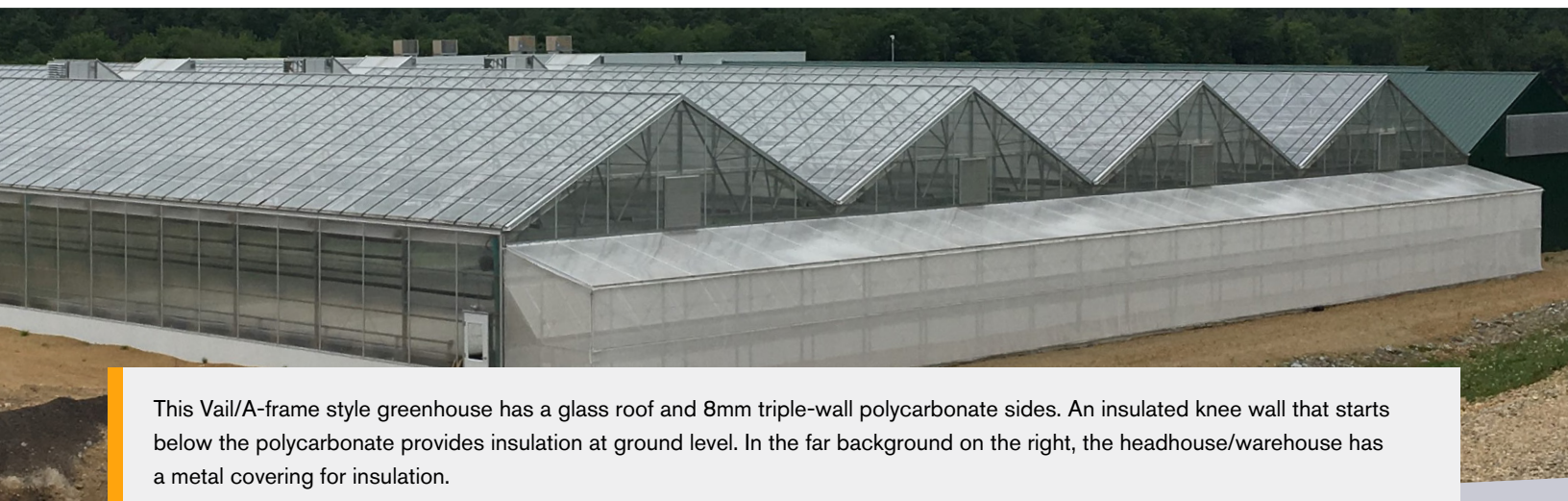
The greenhouse covering you choose impacts the energy consumption, performance and efficiency,

and overall economics of your greenhouse, as well as plant growth and development. When the covering you select doesn't work for your unique production needs, you can end up unnecessarily spending money on other items such as supplemental lighting, heating, or plant growth regulators to compensate.

The smarter way requires starting with a strong foundation from the beginning, meaning the right covering for the right circumstances. By doing this, you'll save yourself from a load of trouble and expenses down the road.

If you remember only one thing about greenhouse coverings, remember that they don't stack up equally. Each glazing type possesses unique attributes and characteristics that determine its strengths and weaknesses for greenhouse use, and subsequently its limitations.

Lifespan, durability, weight, cost, light transmission, heat loss potential, insulative value, upkeep, fire susceptibility — all and more need to factor in when you evaluate your covering options.



This Vail/A-frame style greenhouse has a glass roof and 8mm triple-wall polycarbonate sides. An insulated knee wall that starts below the polycarbonate provides insulation at ground level. In the far background on the right, the headhouse/warehouse has a metal covering for insulation.

The gable ends have corrugated polycarbonate because the lean-to structure is an unheated structure used to insect screen air coming into the greenhouse. The screens run around the perimeter of the lean-to walls.

Photo: Scott Thompson



Determine your greenhouse type and its intended use before you choose a cover. Your covering needs to be compatible with the type/style of greenhouse you plan to use.

Photo: Scott Thompson; Grand Teton greenhouse (Goodness Gardens, NY)

THE THREE FACTORS YOU CAN'T OVERLOOK

Three factors — weather conditions/extreme weather events, the style of your greenhouse, and the type of crop(s) you grow — should weigh heavily in your decision-making, even taking precedence over whether a covering works best for light transmission or insulation.

01 WEATHER

Your greenhouse covering needs to be appropriate for the weather conditions in your climate and the extreme weather events you experience in your area. If golf-ball-sized hail pelting your greenhouse or heavy snowfall weighing the roof down occurs on a regular basis in your area, the last thing you need is a covering that falls apart under those conditions. It poses a potential risk to your crops and costs you more money in the long run, whether it's in the form of maintenance, repair, or replacement.

Additionally, the one-layer greenhouse film that works great for a ground-to-ground greenhouse in a southern climate may not be the best choice for a cooler Northern climate that necessitates a better-insulated greenhouse.

02 GREENHOUSE STYLE

Determine your greenhouse type and its intended use before you choose a cover. Greenhouse glazing needs to suit the greenhouse structure it is designed for.

More permanent structures, such as large ranges of open-roof greenhouses used for plant production, call for longer-lasting, more rigid coverings. A temporary pop-up greenhouse destined only for a few seasons of use requires a covering with a much shorter lifespan.

03 CROP MIX

The crop mix you grow in your greenhouse matters when selecting a covering because not all plants have the same growth requirements. A glazing that knocks it out of the park for sun-tolerant crops such as tomatoes or chrysanthemums, for example, could prove detrimental for shade-loving crops, unless you provide protection for them. If your crops develop too slowly or flowering delays occur, your covering could be the culprit, or at the very least, one of the contributing factors.

The unique properties of greenhouse coverings and their manufacturing additives influence the development of greenhouse crops. For example, if you grow crops such as tomatoes or cut flowers with high light requirements, you don't want a covering with low light transmittance or you could find yourself dealing with problems such as delayed flowering or weak branching.





Polyethylene coverings work great for ground-to-ground structures, such as this Windjammer greenhouse at Lucas Greenhouses in Monroeville, NJ. The affordability of polyethylene films, in part, accounts for their popularity among growers.

Photo: Scott Thompson

GREENHOUSE COVERING TYPES 101

You'll inevitably have many questions when comparing different greenhouse glazing options. Find out the answers to the seven questions listed below for starters.

- What properties or characteristics does this greenhouse covering possess?
- What is the lifespan of my covering? (Similarly, what warranty does the manufacturer offer for longevity?)
- What's the price tag associated with this covering?
- What is the R-value of the covering?
- What degree of light transmission can I expect from this covering?
- What kind of ultra-violet filtering/protection does this covering have?
- How does this covering perform in terms of durability and strength?

Loaded with this information, you'll be in the best position to select a greenhouse covering that matches your greenhouse type, growing needs, climate, and geographical location.

Let's start with a quick review of the main types of greenhouse glazing. First off, according to the [National Greenhouse Manufacturers Association website](#), coverings divide into three categories (NGMA, 2018-2023):

- **Plastic films**
Ethylene vinyl acetate (EVA), polyester, polyethylene (PE), polyvinyl chloride (PVC), and polyvinyl fluoride
- **Flexible plastics**
Single-layer corrugated polycarbonate, fiberglass-reinforced plastic (FPR), multi-wall acrylic, impact-modified acrylic and polycarbonate
- **Rigid glass materials**
Annealed, tempered, and laminated

In this guide, we'll dive more in-depth into some of the more commonly used greenhouse glazing materials rather than try to cover everything listed above.



POLYETHYLENE FILMS: A BUDGET-FRIENDLY, SHORT-TERM SOLUTION

Polyethylene film, nicknamed “poly” or sometimes referred to as plastic film, stands as one of the simplest glazing options available to you, and the most affordable. Plus, you’ll find it easy to handle for installation.

Plastic film thicknesses for commercial greenhouse use range from 2mm to 8mm, with 6mm as a commonly used size for greenhouse applications. One practice to improve insulation involves using two layers of poly film separated by air inflation. This practice reduces wind damage as well.

Polyethylene films work well in a wide range of climates. You commonly see them on hoop houses, high tunnels, and gutter-connected houses. Double-poly film coverings work well for floriculture and vegetable applications.

Compared to rigid glazing options, though, double-poly is more prone to drip. When not inflated, it has the potential to billow in the wind and shower condensation down on your crops and employees. This, in turn, can lead to issues with disease, germination, and unhealthy plant growth. Anti-condensate treatments reduce the surface tension of poly films to discourage the formation of droplets.

Properties/Characteristics

Pliability, lightweight, sturdy, transparent to translucent, generally chemical resistant (but is susceptible to brittleness when burning sulfur), low moisture absorption, recyclable, higher insulative values

Note that you can customize polyethylene films somewhat to meet your various needs by selecting them for additives included during processing that improve their performance.

Lifespan

3-5 years (single layer). Greenhouse-grade polyethylene comes in various film thicknesses.

The thicker the film, the better its longevity and strength.

Longevity depends also on the application and whether you live in an area prone to severe winds, heavy hailstorms, or heavy snow and ice accumulation.

You can obtain some added insurance with woven poly or nylon-reinforced poly, which has a high tensile strength that contributes to its durability for better resistance to weather damage. However, the expense to purchase reinforced poly is generally more than standard thicknesses such as 6mm.

Overall, it's best to view poly as a short-term or less permanent glazing option due to its shorter lifespan. Certain structures, such as the Prospiant Grand Teton and Zephyrs, have a design that accommodates growers who want to start with a poly covering and then replace it with a rigid covering later.

Cost

Polyethylene glazing costs the least among the main covering options. Its affordability, in part, accounts for its popularity among growers.

Check out this example comparison found in the "Ball Redbook" (Jacobson, 2021, p. 30), but keep in mind this is an approximation. Glazing costs vary based on the type of glazing (e.g., thickness, opacity, etc.), additives, brand, availability, etc.

Materials and Installation Costs* for Double Poly Greenhouse vs. Glass Greenhouse		
Double-poly Greenhouse	\$0.50/sq. ft.	\$5.40/sq. m
Glass Greenhouse	\$2.50-\$3.50+ sq. ft.**	\$27-\$32+ sq. m**

*Costs are an approximation for example purposes only

**The type and weight of glass can add to the cost of a project.

R-Value

R-value in simple terms refers to a greenhouse covering's insulating quality or how well a greenhouse covering does at keeping the inside of the greenhouse warm in cold weather. If you want to get more complex, it is a measurement of thermal resistance per unit area.

The higher the R-value, the better the covering performs as an insulator that reduces heat loss to the outside environment. Paying attention to R-values can save you energy costs in the long run.

However, keep in mind that the R-value of the greenhouse can come from its curtain, too. Not every covering is applicable in every case, so your choice should be driven by the type of crop(s) you want to grow and the climate at the greenhouse's location.

The R-value of polyethylene coverings changes depending on whether it's two layers being inflated or just a single layer. Generally, single-sheet poly has an R-value of 0.85, while double poly has an R-value of 1.25 (Fowler et al, 2021).

Polyethylene glazing with infrared radiation (IR) additives reflects IR radiation. They allow heat to leave the greenhouse in the summertime and prevent heat from escaping during the winter, which means it takes less energy to heat the house during the night.

Growers who need to prevent a portion of IR radiation from entering the greenhouse would want the IR plastic on the exterior layer, and those who want to prevent it from leaving the greenhouse need the material as the inside layer. It's most common to see the IR coating used on the inside layer.

When inflated, poly coverings tend to have some of the higher R-values among the various greenhouse covering options. However, this depends on the quality of the installation and how well the greenhouse perimeter is sealed.

When installed properly, poly films allow for less air infiltration because they are one continuous solid sheet running the entire length of the greenhouse. This leaves less opportunity for gaps in the covering that allow cool air to enter the house.

Light Transmission

Light transmission is the portion of light moving through a greenhouse covering not absorbed by the covering or reflected out. Dust accumulation, air pollution, condensation build-up, structure parts, and plastic deterioration over time all impede the light transmission of polyethylene coverings.

Photosynthetically active radiation (PAR) light transmission values also vary depending on the additives included during manufacturing.

Typical PAR Light Transmission Ranges for Polyethylene (Bartock, 2013)	
UV-Stabilized	88%-91%
IR-AC film	82%-87%
IR-AC with diffusion	77%-88%

The diffusion of polyethylene impacts light transmission. Additives in the film give growers the advantage of controlled light diffusion to reduce shadowing in the greenhouse and to allow light to access the lower crop canopy. There are also clear and white poly products that offer different opacities.

One final note on light transmission — the higher insulative values of polyethylene coverings typically come at the cost of lower light transmission values. This can throw you into a constant balancing act between the cost of heating and the cost of supplemental lighting when it comes to covering choices.

Ultra-Violet Filtering

Ultra-violet (UV) stabilizers, or rather chemicals embedded within the polymer of the film, boost the durability of poly coverings and extend their lifespan while helping to prevent discoloration and brittleness. They also shield plants and people from harmful UV rays.

Despite their protective effects, UV poly treatment still allows ample light to reach the crop canopy. Keep in mind, however, that in some plants, exposure to wavelengths of UV light such as UV-A or UV-B can bolster their defenses against pests and diseases and improve their flavor and aroma (Loconsole & Santamaria, 2021).

Beneficial insects, such as parasitoids and pollinators, as well as insect pests also experience the beneficial and detrimental effects of UV light transmission. The same holds true for plant pathogens (Runkle, 2020).

Thermal Expansion/Contraction

Polyethylene has high thermal expansion and contraction. This simply means it expands in warmer temperatures and contracts in colder temperatures.

You need to time the installation of your covering accordingly to avoid problems with sagging, leaking, and cracking. This holds true for the quality of your installation job as well because improper stretching of the covering increases its vulnerability to sagging or stretching.

Carefully consider weather conditions before you install poly; they play a critical role. The less wind, the better. Even light to strong breezes can present a problem. Temperatures need to reach above 35°F for poly installation to avoid contraction. If they climb to 85°F or more, avoid installation or you will get too much stretch in the covering.

Uses

Ground-to-ground greenhouses, hoop houses, gutter-connected Quonset styles.



Polycarbonate panels come in various types, including multi-wall and corrugated, with single-wall and twin-wall panels the most-used for greenhouse applications.

Photo: Paul Golden

POLYCARBONATES: THE VERSATILE, HIGH PERFORMER

In the rigid-plastic glazing category along with fiberglass and acrylic, polycarbonate glazings have snuck up behind glass as a popular covering option. They work for a variety of applications due to their versatility, and glazing doesn't come much tougher than polycarbonate — some types even have enough strength to stop a bullet.

Think of polycarbonate as the lightweight tough guy of the rigid-plastic glazing category with 20 times greater impact resistance than fiberglass and 10 times the strength of acrylic (Churchill and Hasler, 2021, p. 34). It exhibits 200 times the impact resistance of glass while weighing about 1/8 less (Churchill and Hasler, 2021, p. 34).

Polycarbonate panels come in various types, including multi-wall and corrugated, with single-wall and twin-wall panels the most-used for greenhouse applications. Characteristics such as strength, light transmittance, pliability, and more vary depending on the thickness, type, and span between the enclosed flutes (i.e., cross-sectional supports) of polycarbonate panels.

Throughout the year, light transmission levels in the greenhouse vary as the angle of light hitting the greenhouse roof changes due to the motion of the sun as the Earth orbits around it each year. Under ideal conditions, corrugated polycarbonate, particularly clear corrugated polycarbonate, transmits light fairly well. It is not quite as good as glass or acrylic, but still comes close.

Like other coverings, manufacturers incorporate different resins and pigments into polycarbonate glazings to enhance their performance and achieve different effects. Adjustments to light transmission levels can allow for either diffused or direct light to come in or varying degrees of haze.

Considered a “self-extinguishing” thermoplastic, polycarbonate does not support a flame, making it a good choice for greenhouse safety. In a sense, polycarbonates are environmentally friendly. Because you can melt it down to make other items, it is considered recyclable. However, it is not biodegradable.

Properties/Characteristics

Good fire performance, lightweight, high-impact resistance, excellent transparency, heat resistance, recyclable (not biodegradable), UV resistant, flexibility, high strength-to-weight ratio, durable.

Lifespan

Polycarbonate handles easily and bends into different shapes thanks to its flexibility. Twin-wall polycarbonate panels can last for more than 20 years with proper care and cleaning, although most warranties cover around 10 to 15 years, with 10 years for yellowing.

Cost

Polycarbonate glazing tends to cost more than polyethylene films but less than glass and acrylic coverings. Costs for high-performance polycarbonate coverings, not including installation materials or labor expenses, run from \$1.20 to \$2.60 per square foot (Churchill and Hasler, 2021, p. 36).

R-Value

R-values for polycarbonate reach from 1.54 for 6mm

twin-wall to 3.2 for a 16mm five-wall. Corrugated single-layer polycarbonates have a lower R-value than twin-wall polycarbonates with a higher insulative value. Generally, multi-wall polycarbonates have the best R-values and corrugates the worst.

The air pockets or gaps between polycarbonate panels (e.g., flat twin-wall polycarbonate) add insulative value. The larger the gap size, the better the insulation. The label indicates the gap size. For example, 4mm twin-wall polycarbonate indicates a 4mm gap between the panels. Commonly used standards in the greenhouse industry include 8mm and 16mm sizes.

Light Transmission

Light transmission up to 90% for corrugated polycarbonate and from 76% to 80% for multi-wall polycarbonate approaches that of glass, which makes it a popular choice for growers, especially with its lighter weight and lower cost. Available options for the panels include clear, diffused, opaque, and every degree in between, letting all levels of light transmission come through.



Twin-wall polycarbonate panels are extremely durable and have a high insulative value.



Hicks Nurseries (Westbury, NY) has a greenhouse and loading dock area covered with 8mm polycarbonate. The dock area is bronze-tinted 8mm with an opaque roof. This combination reduces light levels in an area where there is more movement of people, plants, and equipment and no shade curtains.

The mainframes of the greenhouse have three different coverings. An 8mm polycarbonate 2 UV covers the atrium vent in the roof. Since the vent opens up and out, it needs UV protection on both sides of the panel for protection from the sun. A twin-wall UV with an exterior UV coating covers the roof slope, and the sides and ends have an 8mm triple-wall UV covering with an exterior UV coating for insulation.

Photo: Scott Thompson

Ultra-Violet Filtering

One interesting feature of polycarbonate greenhouse glazing is it largely reflects UV transmission.

Polycarbonate film also has UV protection either integrated into the film through co-extrusion or via UV coating to slow down the deterioration and discoloration caused by prolonged exposure to the sun. Polycarbonate sheets intended for open-roof structures have two-sided UV protection. These UV-protecting treatments prolong the covering's lifespan, which ranges from 10 to 15 years.

Thermal Expansion/Contraction

Polycarbonate coverings exhibit a high degree of thermal expansion and contraction. Thus, they need a special anchoring or locking system to secure them to the greenhouse frame and mitigate thermal movement.

Corrugated panels are installed with an overlap of themselves and the rivets. Multi-wall is held and secured

with extrusions, either aluminum or polycarbonate, with seams/joints placed every 47½ inches or 71½ inches on center. Some extrusions are gasketed, some are not.

With polycarbonate pre-drilling is not a requirement. You can secure it in the extrusion and point fasten it with a special screw and galvanized washer.

The timing of the installation is also important. Under extreme cold temperatures polycarbonate can chip when being cut with a saw. When cutting polycarbonate, a fine-tooth blade hand trim saw or Skill saw works best for cutting, as well as using an air compressor to blow out the cutting fragments and dirt and dust before installation.

Uses

Greenhouse siding, inside walls (single wall) where insulation and low maintenance are very important.



ACRYLIC: A HIGH LIGHT TRANSMISSION OPTION WITH ENDURING CLEARNESS

Acrylic glazing, known for its excellent transparency and light transmission, works well as a natural insulator to prevent heat loss in the greenhouse. It maintains its clarity over its lifetime without yellowing. It's durable and long-lasting.

Acrylic weighs half as much as glass but has greater strength. While acrylic started out as a pretty brittle material when it first hit the market, much has been done since then to improve its impact resistance.

Hail damage can occur, however, but you usually won't lose your whole greenhouse roof to a hailstorm.

Acrylic's scratch resistance ranks less than that of glass yet greater than polycarbonate. In terms of safety, when acrylic does break on impact, shattering does not occur.

Common thicknesses used for greenhouse applications include 9mm and 16mm panel sizes, with single, twin-wall and triple-wall options available. The thickness and design of the acrylic panel determine the limits of its flexibility. Additionally, acrylic panels come with options for anti-condensation treatments.

Acrylic glazing is more brittle than polycarbonate, so when you attach acrylic to a roof glazing system it may be using the same extrusion system as the polycarbonate. The biggest difference is you don't use point fastening between the glazing bars and extrusions. The entire panel is fastened to the structure through a four-sided extrusion system. You may also have to pre-drill each hole.

Properties/Characteristics

Strong, durable, lightweight, rigid but slightly bendable in some cases, recyclable, high impact resistance

Lifespan

The lifespan of acrylic can reach up to 20 to 25 years or more.

Cost

Acrylics land on the higher side of the cost range for the rigid plastics category. They tend to be more expensive on average than polycarbonate and the installation is a little different in that it doesn't screw directly to the framework of the greenhouse in most cases.

Also, consider that acrylics can be a good option if you don't have a lot of time and money for maintenance because they don't yellow and have a long lifespan. This is more commonly seen in research and institutional types of greenhouses than in commercial settings.

R-Value

Twin-wall acrylic offers excellent insulation and has an R-value of around 1.8. The thicker the sheet of acrylic, the better the heat retention, but it comes at the cost of light transmission. As you move into colder regions of the country, acrylic in the 16mm thickness range begins to offer some operational benefits over glass due to its higher insulative value.

Light Transmission

Acrylic does not yellow or lose its clarity as quickly as other rigid plastics. The light transmission qualities of acrylic combined with its high R-value make it a higher value proposition versus, for example, glass with a lower R-value but similar light transmission levels.

Light transmittance for twin-wall acrylic ranges from 87% to 93% and for single-wall it is 94%.

Ultra-Violet Filtering

Acrylic loses out to polycarbonate in terms of shielding against harmful UV rays yet shows more stability under constant exposure to UV light in terms of degradation. However, panels can be treated to block UV rays. Colored sheets (e.g., gray, white, cool blue) also help

block UV rays and slow down degradation. Bronze-colored sheets reduce glare and light intensity in certain retail and institutional settings to help keep things a little cooler for customer comfort.

Thermal Expansion/Contraction

The timing of acrylic installation matters because it exhibits a high degree of thermal expansion and contraction. If your climate has large temperature swings during the year, take this into account. If you install acrylic during the coldest months of the year and don't leave enough room for expansion, problems with your acrylic during the hottest months of the summer can occur. The same goes for polycarbonate coverings, except they tend to expand and contract at lesser rates than acrylics.

Uses

Retail settings, institutional greenhouses, twin-wall acrylic is a popular option on A-frame and flat-sloped greenhouses.





GLASS: THE LONG-LASTING KING OF GREENHOUSE COVERINGS

Glass is king in the rigid covering spectrum. Many of the large-scale production operations growing ornamentals and produce choose glass to cover their greenhouses because it's durable, easy to maintain, and provides high light transmittance with less light loss than other glazing options. The same goes for conservatories and research greenhouses.

Glass comes in many different types for greenhouses, including floated, colored, low iron, tempered, anti-reflective (AR), safety, and diffused, and is available in varying thicknesses.

As with the other coverings, the quality varies between different types of glass, but for the most part you can make glass perform the way you want it to for greenhouse production. The various additives have some impacts on crop coloration, morphology, and performance.

Coatings applied on glass also enhance its performance. Take anti-reflective coatings, for instance. Some light loss occurs when light enters or exits a glass covering because of reflection. Anti-reflective coatings increase the percentage of light transmission by a few percent, which adds up because of the light loss at entry and exit.

Other types of glass coatings are available to achieve different purposes. Anti-condensate coatings prevent the accumulation of moisture and cause it to spread out evenly in a thin layer. IR coatings keep infrared radiation away from plants, protecting them from heat stress and crop burn.

Properties/Characteristics

High light transmission, low thermal expansion and contraction, durability

Lifespan

Glass lasts a lifetime if it doesn't break. Remember, though, that glass has some intrinsic flaws in it and greenhouse structures shift over time, so some glass breakage is normal.

If you live in a climate known for large-sized hail, you may want to shy away from using glass as a covering. And consider that while glass lasts the longest of all the coverings, it ranks as the most difficult to install.

Tempered glass has four times the strength of regular glass with a similar composition and thickness. It shatters into small pieces instead of the more dangerous long, sharp shards, making it a safer option to protect employees.

Cost

Glass offers the highest quality of the greenhouse glazing options but unfortunately comes with a high price tag to match. Due to its weight, glass requires special supports or aluminum extrusions to mount the panels to the greenhouse frame. This installation cost adds to the high expense of purchasing a glass covering.

R-Value

Single-layer glass coverings have a relatively low R-value, which sometimes makes them impractical for use in Northern climates. The standard R-value usually ranges from .95 to 1.0 for glass 3mm to 4mm thick.

Light Transmission

Standard light transmittance for glass ranges from 88% to 94% with low-iron glass having the highest light transmittance (Evans, 2014).

Anti-reflection (AR) glass has an additional coating layer on the surface of the glass that increases light transmittance and reduces light reflection (Yuhua, n.d.).

As with all coverings, keeping them clean to avoid the buildup of dirt and debris helps with light transmittance. This is especially true with glass, so maintenance costs in this regard need to be considered.

Ultra-Violet Filtering

Glass does not degrade under ultraviolet light, and you can spray various removable coatings on glass to shade plants from infrared light and protect against heat.

Thermal Expansion/Contraction

Glass shows good heat resistance and has a low rate of thermal expansion and contraction.

Uses

Venlo-style greenhouses, A-Frame, Dual Atriums, common for retail settings due to the clean look.



LEARN MORE

Check out "[The Greenhouse Glazing Puzzle: Your FAQs Answered](#)" webinar, where Paul Golden and Scott Thompson dive into the most frequently asked questions about greenhouse glazing.

They provide clear insights and practical advice, addressing key topics such as:

- Optimal coverings for maximum light transmission
- Top glazing choices for insulation
- Hail-resistant glazing for durability
- Cost-benefit analysis of polycarbonate and glass
- Pros and cons of acrylic vs. polycarbonate
- Polyethylene's lifespan and sustainability

Don't miss this chance to get answers straight from the pros. [The Greenhouse Glazing Puzzle: Your FAQs Answered! \(brighttalk.com\)](#)



The R-value of a greenhouse really comes from the curtain. Every time you add a curtain system you essentially double the insulative (R-value) of your greenhouse roof by creating an attic space above the curtain when it is closed.

SOME FINAL THOUGHTS ON CURTAIN SYSTEMS

Greenhouse covering or glazing has a big impact on your operational costs, even more so than the heat source you use. A simple solution to take heat retention a step further is to add a curtain system.

Keep in mind that the R-value of a greenhouse really comes from the curtain. Every time you add a curtain system you essentially double the insulative (R-value) of your greenhouse roof by creating an attic space above the curtain when it is closed.

In some cases, when light costs more to supplement than heat or it makes more sense to allow more natural light into the greenhouse to speed up production, it may be prudent to select a covering for its high light transmission. Why? Because a curtain system can make up for the insulative value you lose.

Most large-scale growers these days opt for the highest light-transmitting covering they can get away with for their climate, whether it is polycarbonate or single-layer poly in a warm climate, or glass for something different. Regardless of what climate they grow in, they know they can get away with this because they can use a shade curtain system as a heat blanket.



READ THE FINE PRINT

No one enjoys reading warranties, but as with any major purchase, you need to understand what is and what is not covered and under what conditions the warranty applies. While many warranties cover similar items, the language varies from manufacturer to manufacturer. Here are five important items to remain aware of with greenhouse covering warranties.

01 **Proof of Purchase/Date of Purchase**

Keep your purchase agreement and receipts on file in case you need them later to make a claim on your warranty.

Some warranties start on the date of manufacture and others on the date of purchase, not when you install the covering. If you choose to install your poly a year after you purchased it, for example, your five-year warranty may now be down to only four years of coverage.

If you discover a problem a few years into your warranty, your manufacturer may decide to give you a refund rather than replace the covering, but don't always count on a full refund. Manufacturers sometimes give refunds that are a percentage of your original purchase price based on the time elapsed from the manufacture date of your covering or from the date of purchase.

02 Installation and Maintenance

Install and maintain your greenhouse covering according to the manufacturer's specifications to keep your warranty valid. Warranty timeframes also vary as to when manufacturers provide replacement parts at no cost to their customers. They may still provide the replacement parts free of charge during the warranty period, but after the first-year warranty mark, customers may be responsible for shipping and handling charges.

Finally, anytime you install a covering with UV or condensate protection, take care to face it the correct way. Turn the UV-protected side outwards and angle it upwards; the condensation-control side always points inward.

03 Chemical Reactions

Review your warranty to identify what approved chemicals, adhesives, cleaners, etc. have compatibility with your covering. For instance, copper-based fungicides may damage or discolor poly films, voiding your warranty.

Also, be cautious as polyethylene films can react with polyvinyl chloride (PVC) pipes (particularly the PVC electrical conduit pipes some building codes require) and degrade when the two come in direct contact. Some warranties exclude coverage for greenhouse films used in direct contact with PVC, whether it is pipes or other PVC parts such as washers.

04 Extreme Weather Conditions

Warranty language varies with respect to when a manufacturer will cover breakage when extreme weather events occur. For example, some warranties only guarantee breakage will not occur if hail is under a certain size and traveling under a certain velocity when it hits your greenhouse, while others just state the warranty covers hail damage.

05 Condensation Control

Items that can void a warranty due to "condensation control failure" include attaching the covering to structural members not designed to collect/remove condensation from the panel, blocked collection systems that cause drips, and use of non-compatible chemicals or cleaning agents.

Warranties can also specify what angles (a.k.a. wetting angles) the interior-surface of a covering cannot exceed to ensure it has good wetting, meaning water spreads out on the surface instead of forming droplets that can drip onto plants. The greater the angle of the covering the greater the chance of droplet formation.

FIND THE RIGHT MATCH FOR YOU

You can spend a lot of money on grow lighting and different avenues for the most effective covering for your greenhouse. When you focus on the simplicities of the matter, however, the cheapest, most sustainable option for a covering captures as much natural light from the sun as possible with as little light loss as possible.

Don't forget that greenhouse performance and efficiency depend on many variables including your geographic climate, greenhouse style, and crop mix. Failing to factor these three important items into your covering decision can lead you in the wrong direction, and it could be a costly one if you need to replace your cover for something that works better.

Do your research. Invest in the time to compare and think about your various options. Lastly, partner with an experienced and knowledgeable supplier who can help you find the right greenhouse covering match for your specific production needs.

TOP QUESTIONS TO ASK WHEN PURCHASING GREENHOUSE GLAZING

- What does the warranty cover for the greenhouse glazing/covering I am purchasing?
- How much light does the greenhouse covering transmit?
- What is the R-value of the greenhouse covering?
- Will this covering save energy?
- What is the purpose of this covering?
- What is my budget?
- How long has the company I am purchasing from been in business? What is their reputation for delivering on time?
- Can this product be recycled?
- What are the purchase, installation, and maintenance costs for this covering?
- Is this glazing a good fit for my crops and growing needs?
- Is this glazing the right fit for my structure type?
- What additives are in the glazing I am purchasing?
- What is the capability of my covering to diffuse light?
- What is the life expectancy of my covering?
- Can my structure handle the weight of the new covering and any other loads that might be placed on it (e.g., snow, wind)?
- How easily can I repair this covering?
- Is this covering flammable?

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WHY CHOOSE PROSPIANT?

Prospiant delivers the expert touch your business demands. With three legacy greenhouse companies including Rough Brothers, Nexus Greenhouse Systems, and ThermoEnergy Solutions united under the Prospiant name, we have unmatched greenhouse manufacturing, design, engineering, construction, and maintenance capabilities.

Our end-to-end expertise is backed by more than 150 years of combined experience in the industry, so you can trust us to deliver the results you need. Don't settle for less. Choose Prospiant and leverage the power of true greenhouse expertise for your business



MEET THE EXPERTS



Paul Golden works as Sales Manager — Commercial Growing at Prospiant where he uses his expertise to serve the floriculture, aquaculture, retail, and vegetable markets. Previously, he spent five years at Nexus Greenhouse Systems (now Prospiant) serving as CEA Engineer/Northern California Sales Rep and Special Projects Engineer. Golden holds a B.S. in Applied Physics and completed his M.S. in Civil and Environmental Engineering, focusing on renewable energy development, during which he played a crucial role as a solar developer with OptiSolar Inc. (now merged with First Solar Inc.). His unique blend of scientific knowledge and practical experience makes him a valuable asset in the fields of agriculture, horticulture, and sustainability.



Scott Thompson has served as Territory Manager at Prospiant for more than two years. Formerly, he spent more than nine years working as the Territory Manager at Nexus Greenhouse Systems (now Prospiant) and as Director of Sales for LINX Greenhouses (a division of Nexus), where he provided sales engineering and service support. Scott served as President of the National Greenhouse Manufacturers Association (NGMA) from 2008 to 2009, as well as serving on its Board of Directors for seven years. Thompson is a published author in several volumes of the *Ball Redbook*, as well as a presenter at various greenhouse conferences on various greenhouse-related topics for more than 40 years. Thompson received his B.S. in Business Administration from Monmouth University.



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Prospiant has a strong legacy, built on the foundation of three industry-leading brands, including Rough Brothers, Nexus Greenhouse Systems, and ThermoEnergy Solutions. With more than 150 years of combined expertise in greenhouse manufacturing, design, construction, and integration, our employees support customers in the commercial floriculture and nursery, retail, institutional, produce, and cannabis markets.

- ✓ Design and value engineer your project
- ✓ Build with local manufacturing and general contracting
- ✓ Integrate the perfect growing environment
- ✓ Operate your facility in optimum condition

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