EVONIK INDUSTRIES

PLEXIGLAS ALLTOP® SDP and PLEXIGLAS RESIST® SDP NO DROP

Energy-Saving Greenhouses with Multi-Skin Sheets

30 Year Guarantee PLEXIGLAS® NO YELLOWING!

PLEXIGLAS® the original from Röhm

Evonik. Power to create.

Maximum Light Transmission and Cost-Saving Heat Insulation for Thriving Plants and Lucrative Yields

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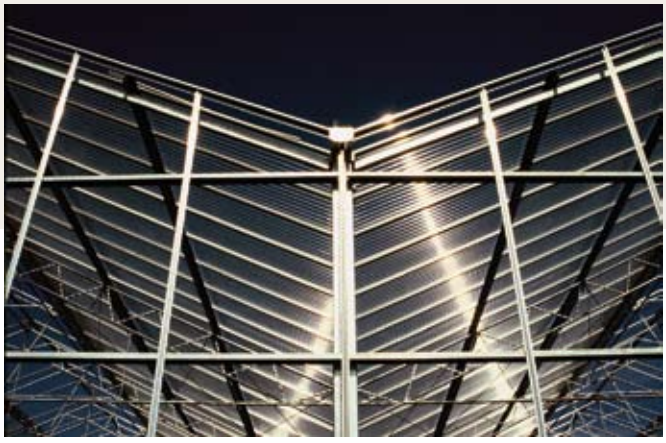

Vibrant blossoms, vigorous ornamental plants and tasty vegetables all appeal to our senses. Offer your customers a range of fresh, colorful and healthy produce that will make their mouths water too!

To obtain that kind of range, correct crop management and a competitive cost structure are essential. Glazing that transmits plenty of light ensures that the plants grow quicker. Good heat insulation enables savings on heating costs and goes easy on the environment. And a high proportion of UV light makes for more intensely colored blossoms.

Those are factors that nowadays decide on the competitiveness of every horticultural operation, and everyone has the chance to collect these points in their favor.

30 Years of Experience with PLEXIGLAS® SP Multi-Skin Sheets in Greenhouse Construction

In 1969, comparative tests were carried out at Rolf Zapf's horticultural business in Kirchardt, Germany. One of the tested greenhouses had single glazing, and the other was glazed with PLEXIGLAS® double-skin sheets. The results:

1. much lower heating costs and
2. in most cases, much earlier and better crop results in the „double-skin sheet greenhouse."

1971 marked the systematic market launch of these sheets. Further pioneering gardeners followed Rolf Zapf's example. One of them is begonia specialist Karl Zwermann in Usingen-Wernborn, who built his first greenhouse with PLEXIGLAS® SDP double-skin sheets in September 1971. It was not to be the last, because his begonias of the elatior variety were of sensational quality and developed blossoms with much more vivid colors.

NO DROP / ALLTOP effect

In 1973, the first oil crisis triggered a rise in demand.

In 1982, two million square meters of PLEXIGLAS® double-skin sheets had already been incorporated into greenhouses.

1985 saw the market launch of PLEXIGLAS® SDP NO DROP. This is a double-skin sheet on which condensation on the NO DROP surface no longer forms droplets, but forms a coherent water film.

1993 brought the next product upgrade. PLEXIGLAS ALLTOP® SDP was presented in time for the 25th anniversary of the PLEXIGLAS® double-skin sheet, and received the „Plantec Award for Technical Progress in Horticulture 1993." On the ALLTOP grade, the time-tested, water-dispersing NO DROP coating is applied at our factory to both sides of the sheet and inside the cavities, and it also has a greater web spacing of 64 mm. This provides a considerable increase in light transmission, bringing it within the range of conventional single glazing.

The Present Situation

Today, greenhouses built with PLEXIGLAS ALLTOP® SDP double-skin sheets have a firm place in the sales ranges of Europe's leading greenhouse manufacturers.

Over six million square meters of PLEXIGLAS® multi-skin sheets have been employed for the construction of commercial greenhouses. PLEXIGLAS® multi-skin sheets have proved themselves to be excellently suited in a wide variety of climatic conditions, both in the snow and ice of the far north and in hot, arid regions.

PLEXIGLAS® multi-skin sheet greenhouse in the Nordic winter

PLEXIGLAS® multi-skin sheet greenhouse with a cooling system, in the desert.

These Are the Major Demands to Be Met by Greenhouse Glazing

High Light Transmission
Light is an essential production factor in horticulture. One percent more light means one percent more growth, according to an often-heard gardener's rule. This means that glazing should transmit at least 85 to 90 percent of the light – the more, the better – to the interior of the greenhouse.

Good Transparency, Especially in Bad Weather
When the sun shines, heat rapidly builds up in the greenhouse and shading devices are usually called for. But the sun doesn't always shine. Particularly in dull weather, it is most important to get as much light as possible into the greenhouse. That is why glazing must have perfectly smooth surfaces to which dirt cannot adhere, and where condensation flows off as a film.

Weather Resistance for Many Years to Come
What use is high initial light trans-mission if the glazing becomes dull in the course of time? Greenhouse glazing must retain its high trans-parency for many years, even decades. Only products that meet these requirements are suitable for this purpose.

The Entire Range of Sunlight
Natural light contains the entire spectrum, including UV radiation in the wavelength from 300 to 380 nm. This promotes vigorous, compact plant growth and gives flowers their glowing colors.

Optimum Heat Insulation
There are always two sides to heating. It costs money and is a burden on the environment. So it's good to be able to heat sparingly. Good for your heating bill, and good for the environment. However, this presup-poses the right kind of glazing. Double glazing with U-values of less than 3 W/m2K should be the norm.

Low Weight
Lightweight, inherently rigid and break-resistant glazing enables effective yet airy structures. A high degree of safety is required, without unnecessarily reducing the incidence of light by too many structural elements.

Good Arguments for PLEXIGLAS®

INSTITUT FÜR TECHNIK IN GARTENBAU UND LANDWIRTSCHAFT
DER UNIVERSITÄT HANNOVER

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6100 Darmstadt 1

Ihre Zeichen	Ihre Nachricht vom	Unsere Zeichen	Tag
		vZ/De	29. Januar 1992

Stegdoppelplatte, allseitig No Drop beschichtet

Sehr geehrter Herr Haußmann,

Sie haben uns allseitig No Drop beschichtete Stegdoppelplatten geliefert, deren Lichtdurchlässigkeit wir auf unserem Lichtmeßstand gemessen haben.

Unsere Messung in trockenem Zustand hat einen Wert von 90,5 % ergeben. Dies liegt im Bereich von Einfachglas und ist nach meiner Auffassung ein sensationeller Wert.

Wenn die Fa. Röhm Interesse hat, könnten wir weitere Untersuchungen anstellen, über die im einzelnen zu sprechen wäre.

Wenn sich die Messungen bestätigen und die Fa. Röhm die Platten auf den Markt bringen will, sollte man Überlegungen anstellen, die Platte auf der nächsten Plantec als Neuheit vorzustellen. Wie Sie wissen, haben wir ähnliche Durchlässigkeiten 1981 bei allseitig mit Sun-Clear-Lösung beschichteten Platten gefunden.

Mit freundlichen Grüßen

Prof. Dr.-Ing. Chr. von Zabeltitz

The optimum glazing material for commercial greenhouses, where it is essential to have the greatest possible light transmission and weather resistance, is the PLEXIGLAS® SDP double-skin sheet.

PLEXIGLAS® multi-skin sheets are not used for garden centers, where other criteria such as a better fire rating have higher priority. For this purpose there are other multi-skin plastic sheets whose strengths lie elsewhere than maximum light transmission and weather resistance.

PLEXIGLAS® multi-skin sheets ...

- **offer unsurpassed light transmission.**

PLEXIGLAS ALLTOP® SDP sheets let approx. 91 % of incident light into the greenhouse. The ALLTOP grade has the time-tested NO DROP coating on both sides and inside the wider cavities of the double-skin sheet. That is a unique high-tech feature for double glazing made of plastics.
Light measurements at Hanover University's Institute of Horticultural Technology showed a value of **90.5 %**. „That is within the range of single glazing, in my opinion a sensational value," stated Prof. Dr.-Ing. Christian von Zabeltitz.

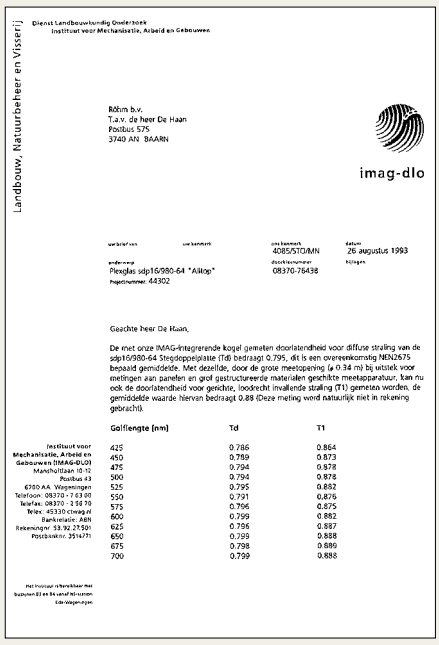
The Dutch Instituut voor de Mechanisatie, Arbeid en Gebouwen (IMAG-DLO) also performed light measurements and established a transmission value of **79.5 %**, even for **diffuse** radiation! „These values are extremely high," and „the use of these sheets in greenhouse construction is very promising," confirmed physicist J. A. Stoffers.

Good Arguments for PLEXIGLAS®

Comparisons between a conventional double-glazed greenhouse and a structure glazed with PLEXIGLAS ALLTOP® SDP show that ALLTOP transmits some 20 % more light. That is an enormous advantage, particularly in the dull season.

- **are renowned for their excellent weather resistance.**

PLEXIGLAS® multi-skin sheets are manufactured from high-quality PLEXIGLAS® molding compound. That guarantees their unsurpassed resistance to aging and weathering, and therefore their suitability for long-term use.



Landbouw, Natuurbeheer en Visserij

Dienst Landbouwkundig Onderzoek
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3740 AN BAARN

imag-dlo

onderwerp: Plexiglas sdp16/980-64 "Alltop"
projectnummer: 44302

ons kenmerk: 4085/STO/MN
doorkiesnummer: 08370-75438
datum: 26 augustus 1993
bijlagen:

Geachte heer De Haan,

De met onze IMAG-integrerende kogel gemeten doorlatendheid voor diffuse straling van de sdp16/980-64 Stegdoppelplatte (Td) bedraagt 0.795, dit is een overeenkomstig NEN2675 bepaald gemiddelde. Met dezelfde, door de grote meetopening (ø 0.34 m) bij uitstek voor metingen aan panelen en grof gestructureerde materialen geschikte meetapparatuur, kan nu ook de doorlatendheid voor gerichte, loodrecht invallende straling (T1) gemeten worden, de gemiddelde waarde hiervan bedraagt 0.88 (Deze meting wordt natuurlijk niet in rekening gebracht).

Golflengte (nm)	Td	T1
425	0.786	0.864
450	0.789	0.873
475	0.794	0.878
500	0.794	0.878
525	0.795	0.882
550	0.791	0.876
575	0.796	0.875
600	0.799	0.882
625	0.796	0.887
650	0.799	0.888
675	0.798	0.886
700	0.799	0.888

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Bankrelatie: ABN
Rekeningnr: 53.92.27.501
Postbanknr: 3514771

ons kenmerk: 4085/STO/MN
datum: 26 augustus 1993
vervolgblad: 1

De waarden zijn bijzonder hoog. Omdat met deze platen onder alle weersomstandigheden, veel energie bespaard kan worden en omdat de, aan dit materiaal aangepaste kasconstructiedelen niet meer licht, hoeven te onderscheppen dan de conventionele, bij enkel glas in zwang zijnde constructiedelen, is toepassing van de sdp16/980-64 in de tuinbouw veelbelovend. Eigenlijk zo veelbelovend dat, toepassing van dit materiaal in onderzoekprojecten waar gezocht wordt naar de juiste teeltmethoden bij het energetisch verantwoord telen in kassen, voor de hand ligt.
Tenslotte wil ik u erop attenderen dat wij overwegen in 1994 een systematisch onderzoek naar de condensdruppelvorm (contacthoek) bij diverse kasbedekkingsmaterialen te gaan doen omdat met de opkomst van energiebesparende kunststofdekken dit kwaliteitskenmerk belangrijker wordt.

Met vriendelijke groet,

Dipl.Phys. I.A. Stoffers

Gartenbautechnische Informationen

1999

INSTITUT FÜR TECHNIK IN GARTENBAU UND LANDWIRTSCHAFT
UNIVERSITÄT HANNOVER

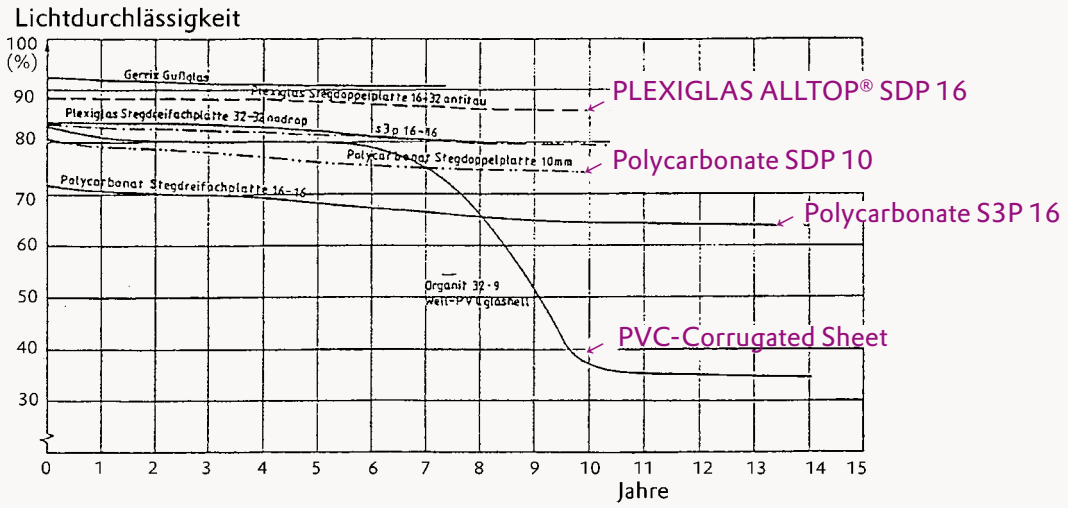

Bild 3: Verlauf der Lichtdurchlässigkeit bei Alterung von Glas und steifen Kunststoffen für Gewächshauseindeckung

We guarantee that clear-transparent solid sheets, multi-skin sheets, corrugated sheets, blocks, tubes and rods marketed under the PLEXIGLAS® trademark will show no yellowing and will retain a high level of light transmission for 30 years.

The diagram of the Institute of Horticultural and Agricultural Technology at Hanover University furnishes additional, neutral proof of these statements.

You are welcome to see for yourself – We will be pleased to name suppliers of PLEXIGLAS® SP greenhouses, which have been in practical use for many years. Compare them with greenhouses made from other plastics, provided these are also 30 years old. The impressions you receive will speak for themselves.

Natural protection against yellowing and loss of light transmission.

As well as providing us with light and warmth, the sun also emits UV radiation. An increasing proportion of harmful UV radiation is reaching the earth due to the hole in the ozone layer.

PLEXIGLAS® is made up of extremely strong, UV-stable molecules throughout the material. The special NATURALLY UV-STABLE technology stabilizes PLEXIGLAS® from the inside out and protects the entire sheet, not just its surface. That means maximum protection against UV radiation, yellowing and loss of light transmission.

PLEXIGLAS®

Naturally UV-Stable

Good Arguments for PLEXIGLAS®

- **are UV-transmitting or UV-absorbing,**
- **are provided with an ALLTOP or NO DROP coating,**
- **are available in break-resistant or even extremely impact-modified grades;**

... choose the PLEXIGLAS® double-skin sheet variety that offers you the most benefits:

PLEXIGLAS ALLTOP® SDP gives you a maximum of light. It transmits the entire range of ultraviolet (UV) radiation that enters the earth's atmosphere. This means your plants get the same composition of sunlight, from UV light via the visible range to the short-range infrared (IR) spectrum, as if they were growing outside. Conditions like those of Mother Nature, so to speak! That is why it is easy to obtain blossoms of intense color and healthy, compact plants by natural means under PLEXIGLAS ALLTOP® SDP. PLEXIGLAS ALLTOP® SDP double-skin sheets provide plants of excellent quality – a crucial advantage. That is why the ALLTOP sheet is the acrylic multi-skin sheet most frequently used for building commercial greenhouses. Not without reason do we deliver several thousand square meters of PLEXIGLAS® double-skin sheets of the ALLTOP SDP grade somewhere in the world every three days, for precisely that purpose.

Impact-modified PLEXIGLAS RESIST® SDP NO DROP sheets do not transmit UV light. With a light transmission of 86 % and the NO DROP coating applied to one side, these particularly impact-resistant multi-skin sheets are nevertheless superior to many conventional types of double glazing. Their main field of application is for innumerable small roofs, e.g. for patios and carports. A PLEXIGLAS RESIST® SDP roof of that kind is put up about once a minute in Germany alone. The salient strengths of PLEXIGLAS RESIST® multi-skin sheets are their extraordinary impact resistance, hail resistance and toughness, for which we also give a 10-year guarantee.

▪ have a very good heat insulation.

PLEXIGLAS ALLTOP® SDP and PLEXIGLAS RESIST® SDP NO DROP both have a U-value of 2.8 W/m² K. Savings on heating costs of 40 % and more are often obtained under practical conditions. These excellent heat-insulation values, together with the high light transmission, make PLEXIGLAS® double-skin sheets the ideal glazing material.

Are you looking for a PLEXIGLAS® glazing material with a U-value of less than 1.8 W/m²K, for a specific building project offering a high degree of heat insulation? Look no further – PLEXIGLAS® is the right choice!

PLEXIGLAS® S4P 32 NO DROP quadruple- skin sheets or PLEXIGLAS HEATSTOP® S4P 32 NO DROP quadruple-skin sheets with an integrated sunscreen that reflects infrared light have a U-value of 1.6 W/m²K. The latter are particularly popular in Belgium for example, where conservatories are all the rage and are the byword for quality of life. Belgian conservatory manufacturers build one highly heat-insulated conservatory about every 20 minutes – with a roof made of PLEXIGLAS HEATSTOP® S4P.

Venlo greenhouse with PLEXIGLAS® SP

Good Arguments for PLEXIGLAS®

- **have low weight, high flexural strength and large sizes.**

16mm thick PLEXIGLAS ALLTOP® SDP double-skin sheets weigh only 5 kg per square meter. At the same time, they show very good inherent rigidity. The ALLTOP sheets are extruded in widths of 980 mm, 1053 mm and 1200 mm. The sheets are manufactured to order in the required lengths, and are produced and installed in one piece, whether in lengths of 1.65 m for a Venlo roof or of 10 m for a wide-span Finnish greenhouse (i.e. one with particularly wide bays).

That dispenses with sheet joints that might prevent the snow from sliding off in the Scandinavian winter. Thanks to its low weight and good break resistance, a sheet of 10 m in length, 980 mm in width and weighing 49 kg, for example, can be installed safely and rapidly.

Wide-span greenhouse with PLEXIGLAS® SP

Properties of PLEXIGLAS® SP at a Glance

Table of Typical Values

	Unit	PLEXIGLAS ALLTOP® SDP 16	PLEXIGLAS RESIST® SDP 8 NO DROP	PLEXIGLAS RESIST® SDP 16 NO DROP	PLEXIGLAS RESIST® S4P 32 NO DROP
U-value	$W/m^2 K$	2.5	3.4	2.5	1.6
Lighttransmission	%	approx. 91	approx. 84	approx. 86	approx. 76
UV-transmission	-	yes	no	no	no
Sheet thickness	mm	16	8	16	32
Web spacing	mm	64	16	32	32
Sheet widths	mm	980 1053 1200	1200	980 1200	1230
NO DROP coating		on both sides and in the cavities	in the cavities-facing side	in the cavities-facing side	in the cavities-facing side
ALLTOP grade		yes	no	no	no
Max. service temperature	°C	70	70	70	70
Possible expansion due to heat and humidity	mm/m	approx. 5	approx. 6	approx. 6	approx. 6
Fire rating according to DIN EN 13501 DIN 4102 BS 476, Teil 7 NF 16–101		 Class E B2 Class 4 M4	 Class E B2 Class 4 M4	 Class E B2 Class 4 M4	 Class E B2 Class 4 M4

Properties of PLEXIGLAS® SP at a Glance

Assembly Systems
A whole series of different glazing bars are available for installing PLEXIGLAS® multi-skin sheets, in the form of kits developed by leading manufacturers of glazing sections and greenhouses especially for commercial greenhouse construction.

Our brochure „Guidelines for Installing Multi-Skin Sheets“ (Ref. No. 314-1) contains basic information on the installation and use of PLEXIGLAS® multi-skin sheets. We will be pleased to send you a copy on request.

Cleaning
PLEXIGLAS® double-skin sheets have a perfectly smooth surface that shows no change over many years, thanks to the material's excellent weather resistance. Given an adequate roof pitch, the outward-facing side of the sheet is cleaned by the rain. The inside of the glazing can be simply cleaned with clear warm water to which some dishwashing liquid has been added. Aggressive cleaning agents should not be used.

Shading
This is usually done by means of mobile interior shade systems made of UV-resistant cloth.

Fire Rating
PLEXIGLAS® double-skin sheets are classed as „B2 normal entflammbar" (normally flammable) according to DIN 4102. The relevant ratings in the U.K. are Class 4 according to BS 476, Part 7, Class E according to the European DIN EN 13501 and M4 according to standard NF 16-101 in France.

Recycling
Owing to its excellent properties, PLEXIGLAS® is a material that is employed for high-quality, durable consumer and commercial items.

As a polymethyl methacrylate, or acrylic, PLEXIGLAS® contains no hazardous substances and releases no pollutants to the environment. This applies equally during application, processing and recycling. After careful separation from other materials and different types of plastic, PLEXIGLAS® can be reduced to its original constituent, monomeric methyl methacrylate, by means of a chemical process (cracking). This monomer is then used as the starting material for other methacrylate applications (such as emulsions/dispersions).

We have reached an agreement with various recycling companies to include customer companies in a uniform recycling system for PLEXIGLAS®. If you are using PLEXIGLAS® SP to glaze new greenhouses and would like to pass on used acrylic multi-skin sheets for recycling, we will be happy to give you the addresses of the relevant companies.

Examples with PLEXIGLAS® SP from the World of Horticulture

- Greenhouses made from PLEXIGLAS® multi-skin sheets with and without NO DROP coating
- Location: V.D.E. plant b.v. in Woubrugge (The Netherlands)
- Total area glazed with PLEXIGLAS® SP: approx. 100,000 m^2
- Built in several stages between 1977 and 2006
- Fabricator: Thermoflor, Wateringen, Netherlands

V.D.E. plant is one of the Netherlands' largest horticultural companies that grows green houseplants. Their range includes palms such as Areca lutescens, Caryota mitis, Chamaedorea elegans and other green plants like Dizygotheca elegantissima, Beaucarnea recurvata and Murraya paniculata. Flowering pot plants like Euphorbia milii ‚Vulkanus' and Spathiphyllum ‚Cupido' round off the range. Mr. Van der Eijk relies on PLEXIGLAS® multi-skin sheets because they guarantee good produce by ensuring constant climatic and lighting conditions. The first 10,000 square meters of PLEXIGLAS® multi-skin sheets were installed here 31 years ago, and have meanwhile paid off several times over by enabling energy savings of some 40 % as compared with conventional single glazing, and by reducing the load on the environment. In 1998, V.D.E. plant won the Dutch horticultural business prize. The last construction phase was in 2006 and involved 16,000 m^2 of PLEXIGLAS ALLTOP® SDP.

- Greenhouses made from PLEXIGLAS ALLTOP® SDP, approx. 37,000 m², built in 1999, 2002 and 2006.
- Location: Hydrokultuur Nieuwkoop in De Kwakel (The Netherlands)
- Fabricator: Van Diemen, De Kwakel, Netherlands

The PLEXIGLAS ALLTOP® SDP double-skin sheet perfectly matches the concept behind this outfit, which is to cultivate green plants at a constant high level of atmospheric humidity. The good lighting conditions under the ALLTOP roofing are another major advantage mentioned by this business.
A special feature is the construction of the greenhouse complex, consisting of wide-span greenhouses all round and a central section with a special Venlo structure that makes it possible to accommodate very tall exhibition plants.

Examples with PLEXIGLAS® SP from the World of Horticulture

- Greenhouses built with approx. 60,000 m² of PLEXIGLAS ALLTOP® SDP in several construction phases from 1999 to 2008
- Location: Truck Farm Schoone in Heemskerk (The Netherlands)
- Fabricator: Bosman, Aalsmeer, Netherlands

The Schoone truck farm specializes in growing orchids (Phalaenopsis). Here too, the climate and UV transmission are a big advantage, as Mr. Kees Schoone reports. The windtight double-skin sheet greenhouses provide a tropical climate in which orchids feel at home. The UV transmission has a positive effect on growth. The owners therefore feel they are investing in vigorous growth and energy savings.

- Greenhouses built with approx. 60,000 m² of PLEXIGLAS ALLTOP® SDP in several construction phases from 1999 to 2005
- Location: Truck Farm Blom in Aalsmeer (The Netherlands)
- Fabricator: Van Diemen, De Kwakel, Netherlands

For their new 6-hectare outfit in Aalsmeer, the Blom brothers have also decided in favor of a roof with PLEXIGLAS ALLTOP® SDP. They cultivate palms up to 5 meters in size. The savings in heating costs, the long-term investment in the future and the possibility of better regulating the greenhouse climate were their major decision criteria.

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 18,000 m², built in 1999 and 2000.
- Location: Truck Farm Van Leeuwen in Amstelveen (The Netherlands)
- Fabricator: Bosman, Aalsmeer, Netherlands

As in the summer of 1999, pot plant specialist Van Leeuwen again chose PLEXIGLAS® double-skin sheets of the ALLTOP grade to build the new section in 2000 consisting of greenhouses with bays of 9.60 m in width.

Examples with PLEXIGLAS® SP from the World of Horticulture

- Greenhouses made of PLEXIGLAS RESIST® SDP, approx. 50.000 m², built in 2003 and 2008
- Location: Sion Orchids in De Lier (The Netherlands)
- Fabricator: Technokas, NL-De Lier

Sion Orchids has been growing potted Phalaenopsis orchids under PLEXIGLAS RESIST® SDP 16 NO DROP glazing since 2003. The excellent climate beneath these sheets was one of the main features that convinced Eric Moor. Energy savings and the benefits for the plants themselves tipped the scales in favor of PLEXIGLAS®.

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 28,000 m^2, built in January 2000 and 2002.
- Location: Truck Farm Mustakosken in Seinäjoki and Kaskinen (Finland)
- Fabricator: Schetelig, Turku, Finland and Viemose-Driboga. Tommerup, Denmark

Mr. Jorma Mustakosken cultivates cucumbers and tomatoes in three greenhouses with a total surface area of about 7 hectares. He has had over 20 years' experience with PLEXIGLAS® double-skin sheets. But never before have the yields in cucumbers and tomatoes been so high as in the two new PLEXIGLAS ALLTOP® SDP greenhouses in Seinäjoki, which are 21m wide and 240 m long. The climate is very good and the lighting conditions are fantastic, thanks to the ALLTOP coating.

Examples with PLEXIGLAS® SP from the World of Horticulture

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 30.000 m² and PLEXIGLAS RESIST® SDP 16 NO DROP, approx. 12.000 m², built between 1998 and 2007
- Location: Truck Farm Honkatarhat Oy and Kyröntarhat Oy in Honkajoki and Kyrö (Finland)
- Fabricator: ES-AN Oy, Kalanti, Finland and Viemose Driboga, Tommerup, Denmark

Timo Rapila also opted for the merits of highly light-transmitting PLEXIGLAS ALLTOP® SDP and RESIST® SDP for his greenhouses. He has been growing cucumbers, salad plants and potted herbs for over 15 years in PLEXIGLAS® SDP greenhouses. “PLEXIGLAS ALLTOP® sheets are the most innovative material available on the market,” says Teemu Kanasuo, Sales Manager of this huge vegetable-growing establishment.

- Greenhouses built with approx. 10,000 m² of PLEXIGLAS ALLTOP® SDP in several construction phases from 2000 to 2008
- Location: Orto Novo market gardens in Ekerö (Sweden)
- Fabricator: Grönsta-Nop (Sweden), Thermoflor (Netherlands). Viemose-Driboga (Denmark)

Orto Novo specializes in growing herbs like basil, thyme, sage, lemon balm and dill. "What we appreciate most about PLEXIGLAS® is its high stability and light transmission," says Alvar Kårfors, Junior Managing Director at Orto Novo. Based on the idyllic island of Ekerö, Orto Novo supplies wholesalers and restaurants in the greater Stockholm area and the whole of Sweden with delicious fresh herbs.

- Greenhouses built with approx. 14,000 m² of PLEXIGLAS® SDP NO DROP and ALLTOP® SDP in 1985 and 2006
- Location: Jörgen Karlsen in Fall (Norway)
- Fabricator: Thermoflor, Wateringen (Netherlands)

Jörgen Karlsen operates one of Scandinavia's biggest cut-flower businesses between Oslo and Lillehammer and the town of Fall in the Söndre Land area. The PLEXIGLAS® greenhouses have held their own through the icy Nordic winters in Fall since 1985. The material's high UV transmission promotes color development in the tulips and lilies that Karlsen grows.

Examples with PLEXIGLAS® SP from the World of Horticulture

- PLEXIGLAS ALLTOP® SDP greenhouse, approx. 11,400 m², built between 2001 and 2007
- Location: Lund nursery in Broby (Denmark)
- Fabricator: Viemose-Driboga, Tommerup (Denmark)

Here on the Danish island of Fünen, brothers Stefan and Thorsten Lund grow the hibiscus, also known as the national flower of Hawaii. PLEXIGLAS ALLTOP® SDP sheets enable savings of about 40% in heating costs. "And we also have PLEXIGLAS® with its high light transmission to thank for the vivid colors of our hibiscus plants," Thorsten Lund confirms.

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 3,700 m², built in 1997.
- Location: Truck Farm Van Oordt in Stäfa/Zürich (Switzerland)
- Fabricator: Thermoflor, Wateringen, Netherlands

Thomas van Oordt, a Swiss producer of cut flowers, has extensive experience with PLEXIGLAS® multi-skin sheets. The good lighting and climatic conditions below the UV-transmitting PLEXIGLAS® sheets make sure that his roses, Alstroemerias, lilies and chrysanthemums are of excellent quality.

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 40,000 m^2, incorporated in 1996 and 1997.
- Location: Truck Farm Rutishauser in Züberwangen (Switzerland)
- Fabricator: Thermoflor, Wateringen, Netherlands

This is a superlative pot-plant operation. Kurt Rutishauser grows begonias, African violets, kalanchoes, poinsettias, cyclamens, primulas, pelargonias and other flowering plants. The greenhouses are much brighter, even to the naked eye. The UV-transmitting PLEXIGLAS ALLTOP® SDP sheet means that the cultivated plants are of much more intense color than in conventional greenhouses, as this Swiss gardener tells us.

Examples with PLEXIGLAS® SP from the World of Horticulture

- Greenhouse made of PLEXIGLAS ALLTOP® SDP, approx. 800 m², built in 1999.
- Location: Truck Farm Glockengießer in Deutschlandsberg (Austria)
- Fabricator: Voith, Traun, Austria

1.20m wide PLEXIGLAS ALLTOP® SDP sheets also provide pot-plant cultivator Glockengießer with strong, compact plants that bloom in the richest of colors.

- Greenhouses made of PLEXIGLAS® SDP NO DROP, approx. 6,000 m², built in 2008.
- Location: Truck Farm Fischer in Rodgau-Dudenhofen (Germany)
- Fabricator: Thermoflor, Wateringen, Netherlands

Rüdiger Fischer was the first horti-culturalist to use the PLEXIGLAS® double-skin sheet with a NO DROP coating in 1985. In 2008, his sons decided to glaze another surface area of about 6,000 square meters with PLEXIGLAS ALLTOP® multi-skin sheets. His crops are pot plants such as heathers, azaleas, cyclamens, poinsettias and pelargonias.

- PLEXIGLAS ALLTOP® SDP greenhouse, approx. 6,500 m², built in 2007.
- Location: Bremkens nursery in Geldern-Walbeck (Germany)
- Fabricator: Brouwers, DE-Geldern

Phalaenopsis specialist Matthias Bremkens grows and produces only this variety in the form of young plants, raw material and finished plants. For the most recent construction phase in 2007 he also chose the ALLTOP sheets with their excellent light and UV transmission.

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 20.000 m², built in 2006
- Location: Truck Farm Van der Weijden in Aalsmeer (Netherlands)
- Fabricator: Bosman, Aalsmeer (Netherlands)

Van der Weijden's orchid-growing establishment is located in Kudelstaart near Aalsmeer, and cultivates a wide selection of orchids on a surface area of about 9 ha. Besides Phalaenopsis, the company supplies other varieties like Cambria, Dendrobium, Paphiopedilum and Vanda.

Examples with PLEXIGLAS® SP from the World of Horticulture

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 40.000 m², built between 2003 and 2006
- Location: Hollandia Produce in Carpinteria (USA)
- Fabricator: Greenhouse System USA, USA-Watsonville CA

In the Californian town of Carpinteria, Pete Overgaag decided to use ALLTOP® sheets too. The high UV transmission of the glazing has a particularly beneficial effect on red-leaved Lollo Rosso salad plants.

- Greenhouses made of PLEXIGLAS ALLTOP® SDP, approx. 2,000 m², built in 1995.
- Location: Newland's Flowers in Leamington, Ontario (Canada)
- Fabricator: Frank Jonkman, Bradford, Ontario

„We could see the advantages in terms of plant growth and energy savings straight after fitting the ALLTOP sheets into our most recent greenhouse," said John R. Newland, a rose grower in Canada.

- PLEXIGLAS RESIST® SDP 8 NO DROP greenhouses, approx. 100,000 m², installed between 2005 and 2007
- Location: Matsui Nursery in Salinas, California (USA)
- Fabricator: Greenhouse System USA, Watsonville, CA

Andy Matsui from California's Salinas Valley opted for cold-curvable PLEXIGLAS RESIST® double-skin sheets for his curved greenhouses. The long service life of the PLEXIGLAS® glazing and the excellent climate in the greenhouses were his main reasons for choosing this material. Matsui produces about 20% of all the orchids grown in the USA.

Examples with PLEXIGLAS® SP from the World of Horticulture

- PLEXIGLAS RESIST® SDP 16 NO DROP and PLEXIGLAS® SDP 16 greenhouses, approx. 80,000 m², installed between 1997 and 2007
- Location: Rosa Flora in Dunnville, Ontario (Canada)
- Fabricator: Edwards Greenhouses, Dunnville, Canada

Otto and Corine Bulk moved to Ontario from the Netherlands and built up one of the country's biggest cut-flower establishments. The company based in Rosa Flora cultivates a wide range of fresh cut flowers like roses, Alstroemeria (Peruvian Lilies), gerbera and snapdragons that all flourish under PLEXIGLAS®. "Even the 20-year-old PLEXIGLAS® sheets are still as clear as on day one," Otto Bulk confirms.

- PLEXIGLAS® SDP 16 NO DROP and PLEXIGLAS RESIST® SDP NO DROP greenhouses, approx. 3,200 m^2,
- installed between 1985 and 2007
- Location: Yasui market gardens in Shizuoka (Japan)
- Fabricator: Hyodo, Fukuroi, Japan

Mr. Yasui grows the famous Shizuoka Crown Melons in 14 special greenhouses. All his greenhouses are glazed with PLEXIGLAS®.
Thanks to the excellent climate beneath the PLEXIGLAS® sheets, the Crown Melons are produced in outstanding quality.

® = registered trademark

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