

VEKAPLAN
Sheets

VEKAPLAN

PROCESSING METHODS



CONTENTS

	Page
VEKA Portrait	4
Introductory Note	6
VEKAPLAN sheet program	7
VEKAPLAN product properties	8
VEKAPLAN test certificates	10
VEKAPLAN tolerances	12
VEKAPLAN packaging/storage	13
VEKAPLAN application possibilities	14
VEKAPLAN processing methods	16
Sawing, Milling, Drilling	17
Cutting, Punching	19
Screen Printing	20
Painting	21
Digital Printing	22
Laminating	23
Bending, Thermal Forming	24
Welding	25
Bonding	26
Fixing by screw, Fixing by rivet	27
Processing methods for outdoor use	28
Resistance to chemicals	35



world-wide and close to the customer



VEKAPLAN - definitely a strong partner

The VEKA AG with its 3000 staff members and 25 producing subsidiaries on four continents is a world-wide leading company for PVC profile systems for windows, doors and roller shutters as well as for form systems and VEKAPLAN PVC sheets. Due to its market leadership lasting for decades in the sheet domain the VEKA AG, as a family run company, ensures you a successful, mutual partnership.

With VEKAPLAN you get a unique and wide-range sheet programme. It contains different PVC sheet types for various styling possibilities and different fields of application – for construction area over exhibition constructions and shop fittings up to display design.

But not only for the products but also for the service VEKA applies the highest standard. A unique spectrum of market and success orientated service are offered to all partners.

This includes comprehensive marketing assistance, qualified support by a personal contact person from the application technology to the sales department, a cutting service for special applications and an elaborate logistic concept: With a large stock prompt deliveries are guaranteed.



In addition, PVC waste and scrap material are taken back and are led back to the production circuit.

In this way you profit as a VEKA partner from the remarkable range of products with an excellent service - and from the certainty of a stable partnership.



INTRODUCTORY NOTE

The information provided in this brochure is a guideline based on the many years of experience our company has had in the area of semi-finished PVC production. All the featured VEKAPLAN products are subject to continuous quality control; in practice, however, it is possible that figures quoted here differ because of variations in the manufacturing processes and other external influences. For outdoor use please pay attention to the corresponding processing advice.

Top Quality Assurance

Our stringent quality control program covers every step of the production process, all the way from the compounding of the raw materials to the fully automated sheet production facilities. This guarantees you consistently high quality. The experienced staff of our production testing centre continuously monitor the quality and properties of all the sheets in the VEKAPLAN range, using modern inspection instruments and equipment. VEKA has the test certificate according to ISO 9001.

Manufacturer and Producer Instructions

All manufacturer instructions or to be more precise product instructions over foreign products are to be considered merely as recommendations and helpful tips on our part and involve no guarantee for the suitability of the product. Basically the manufacturing hints of the product producers are to be followed.

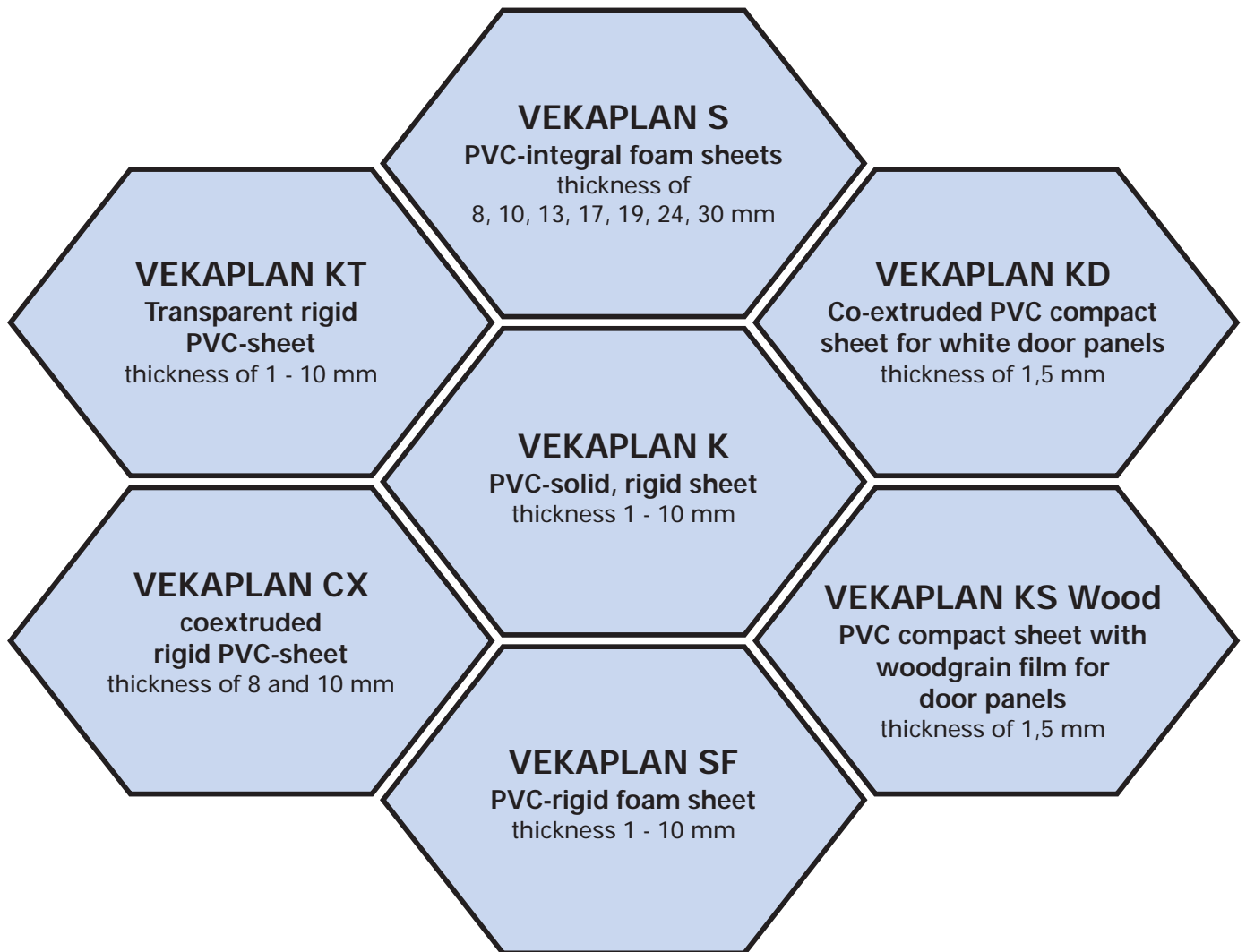
Technical data and advisory service

The following information and the advice of our technical department in spoken, in written and made by tests are given to the best of our knowledge, but can only be regarded as information without obligation owing to a lack of knowledge in respect of the general conditions of the individual cases. This also applies for possible trade mark rights of a third party. The advice does not release you from your own tests of our current advices and of our product with regard to their suitability for the intended processes and purposes. The application, the use and the processing of our products and of the products manufactured by you on the basis of our technical advice are carried out beyond our control and we therefore assume no responsibility for it.

Please contact our advisory staff if this brochure does not provide sufficient information to answer your questions.

VEKAPLAN

The universal sheet program



Detailed information about the delivery program can be found in the VEKAPLAN-delivery overview.

DIVERSITY WITH

PRODUCT PROPERTIES

Properties	Norm	VEKAPLAN S		
Thickness [mm]		8, 10, 13, 17	19, 24	30
Density [g/cm ³]	DIN EN ISO	0,47 - 0,60	0,47 - 0,65	0,55 - 0,70
E-modulus [Mpa]	ISO 527 (50 mm/min)	*1050	*1050	*1050
Impact resistance (Charpy) [kJ/m ²]	ISO 179/1eU	*20	-	-
Notched impact resistance (Charpy) [kJ/m ²]	ISO 179/1eA	-	-	-
Tensile strength [Mpa]	ISO 527 (50 mm/min)	*11	*11	*11
Flexural strength [Mpa]	ISO 178 (2 mm/min)	*21	-	-
Shore-hardness D	ISO 868	66 - 70	-	-
Surface resistance ROE [Ω]	DIN IEC 60167	2,00E+14	-	-
Volume resistance RD [Ω]	DIN IEC 60093	1,86E+14	-	-
Dielectric strength E _d [KV/mm]	DIN IEC 243	-	-	-
Dielectric constant ε _r	DIN 53 483	1,6 - 1,8	-	-
Coefficient of expansion [10 ⁻⁴ /K]	DIN 53 752	6 · 10 ⁻⁵	-	-
Compressive strength [N/mm ²]	DIN 53 421	3,8	3,5	3,5
Vicat softening point [°C]	ISO 306 (B 50)	73 - 76	-	-
Heat distortion temperature [°C]	ISO 75-2 (1,8 Mpa)	57	-	-
Water absorption [%]	ISO 62 (after 216h)	*4,9	-	-
Water vapour – diffusion equivalent S _d [m]	DIN 52 615	157 (for 10 mm)	-	-

* following the standard

** density 0,75 g/cm³

OUT BORDERS

VEKAPLAN SF		VEKAPLAN K	VEKAPLAN KD/KS	VEKAPLAN KT
1**, 2 - 4	5 - 10	1 - 8	1,5	1 - 8
0,65	0,55	1,38 - 1,46	1,39 - 1,42 / 1,26***	1,38 - 1,42
1100	1100	3550	2900 / 2700***	3870
17,2	-	without breakage	without breakage	82,5
3,1	-	7,1	7,3 / 8,0***	2,9
19,5	-	48	46	69,2
32,9	-	79,8	80	105
44 - 47	39 - 42	79	77 / 82***	85
2,00E+14	-	2,00E+14	-	2,00E+14
7,94E+13	-	6,90E+13	-	1,02E+14
-	-	16,8	-	15,8
1,8 - 2,1	-	3,0 - 3,6	-	2,8 - 3,3
$6 \cdot 10^{-5}$	-	$7 \cdot 10^{-5}$	$8 \cdot 10^{-5}$	$9 \cdot 10^{-5}$
-	-	70	-	-
57	-	80	70 / 78***	70
57	-	60	60 / 70***	60
0,9	-	0,09	0,09	0,09
-	-	-	-	-

*** values for KS Wood



TEST CERTIFICATES

Fire-resistance	Norm	Class	VEKAPLAN S	VEKAPLAN SF	VEKAPLAN K	VEKAPLAN KT
Germany	DIN 4102	B1	8 - 13 mm on request	2 - 10 mm indoor use	1 - 2 mm	0,8 - 4 mm
					3 - 4 mm on request	
		B2	8 - 24 mm	1 - 10 mm 3 + 5 mm coloured	1 - 4 mm	
Great Britain	BS 476	Class 1	8 + 13 mm on request	3 mm on request	3, 4, 5 mm	3 + 5 mm
France	NF P 92501	M 1	8 - 19 mm on request	2 - 10 mm	1 - 6 mm	0,8 - 6 mm 3 mm in DB 123
		M 2		3 + 5 mm coloured	8 + 10 mm	8 + 10 mm
Italy	CSE-RF 2/75/A	Cat. 1		1 - 10 mm	1 - 4 mm	0,8 - 10 mm

		Sound Isolation	Thermal Conductivity
Properties	Thickness [mm]	Value [dB]	U-Value [W/m ² K]
Norm		DIN ISO 717-1	DIN 52 612
VEKAPLAN S	8	26	3,0
	10	27	2,8
	13	28	2,4
	17	30	2,2
	19	30	2,0
	24	31	1,8
	30	32	1,6
VEKAPLAN SF	5	24	3,7
	8	27	3,2
	10	28	3,0

TOLERANCES

	Length	Width	Thickness
VEKAPLAN S	+ 10,0 mm - 0,0 mm	+ 6,0 mm - 0,0 mm	$\pm (0,08 \text{ mm} + 0,03 \text{ mm} \times S)$
VEKAPLAN SF	+ 8,0 mm - 0,0 mm	+ 1,0 mm - 0,0 mm	$\pm (0,08 \text{ mm} + 0,03 \text{ mm} \times S)$
VEKAPLAN K	+ 3,5 mm - 0,0 mm	+1,0 mm - 0,0 mm	$\pm (0,08 \text{ mm} + 0,03 \text{ mm} \times S)$
VEKAPLAN KD	+ 4,0 mm - 0,0 mm	+ 4,0 mm - 0,0 mm	$\pm (0,08 \text{ mm} + 0,03 \text{ mm} \times S)$
VEKAPLAN KS	+ 4,0 mm - 0,0 mm	+ 4,0 mm - 0,0 mm	$\pm (0,08 \text{ mm} + 0,03 \text{ mm} \times S)$
VEKAPLAN KT	+ 4,0 mm - 0,0 mm	+ 4,0 mm - 0,0 mm	$\pm (0,08 \text{ mm} + 0,03 \text{ mm} \times S)$
Cuttings	$\pm 0,5 \text{ mm}$	$\pm 0,5\text{mm}$	

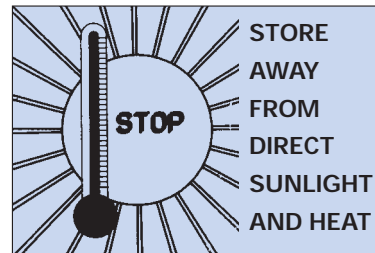
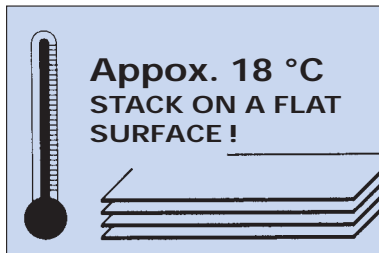
L = length of the sheet in m

S = thickness of the sheet in mm

PACKAGING AND STORAGE

VEKAPLAN sheets are stacked on wooden palettes. To protect against damage and grime the palettes are provided with a labelled cover sheet and then wrapped in film.

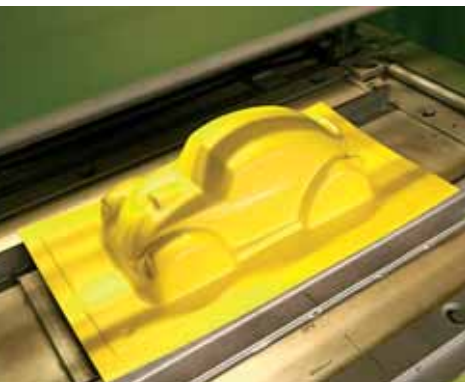
VEKAPLAN sheets should be stored in warm conditions and stacked on flat surfaces to avoid unnecessary bending.



The transparent VEKAPLAN KT and W sheets should never be stacked in direct sunlight as this can result in a dangerous heat magnification effect. For VEKAPLAN W sheets, the stacking height should not exceed 50 cm.

Storage on heated surfaces and in damp surroundings should be avoided.

Advice: VEKAPLAN sheets are provided with a protection film on one or both sides, depending on the type of the sheet. This protection film should be removed immediately after installation !



Daily life is unimaginable without vacuum formed pieces made of PVC. Also the continuous development of the VEKAPLAN sheets contributes to the discovery of new fields of application.
















A material goes around the world: Up to a globe virtually every kind of cavity forms can be realised with VEKAPLAN sheets.



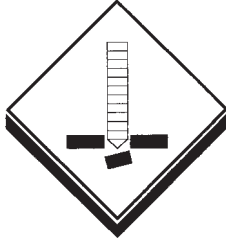
VEKAPLAN – we give shape to your ideas

**VEKAPLAN sheets for the
construction, promotional and
industry sector**

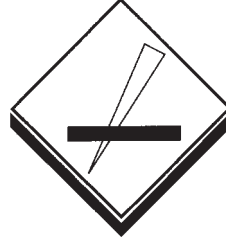


-  Storage Rooms
-  Room division elements
-  Door panels
-  Partitions
-  Roofing
-  Covers
-  Displays
-  Signs
-  Exhibition construction
-  Laboratory fittings
-  Display cases
-  Marquee walls
-  Sandwich panels

PROCESSING METHODS



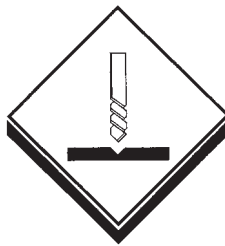
Punching



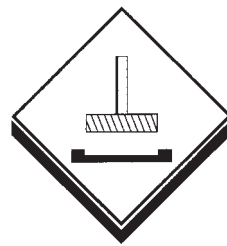
Cutting



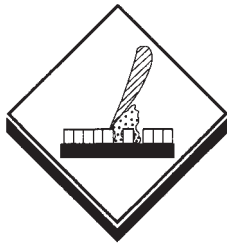
Sawing



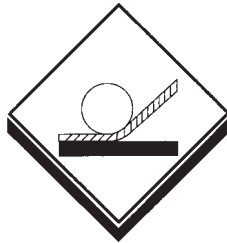
Drilling



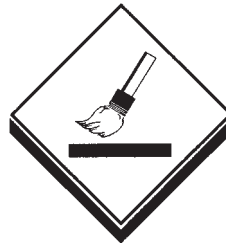
Milling



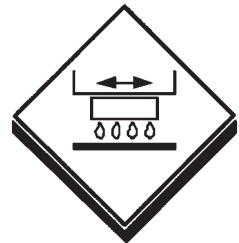
Screen Printing



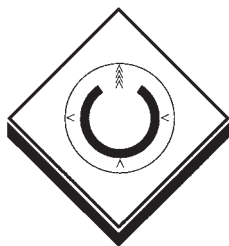
Laminating



Painting



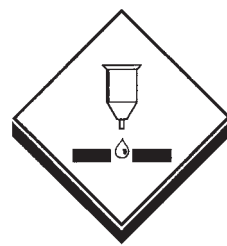
Digital printing



Thermal Forming



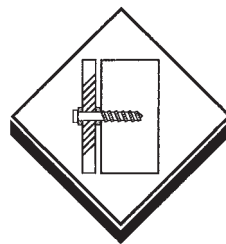
Welding



Bonding

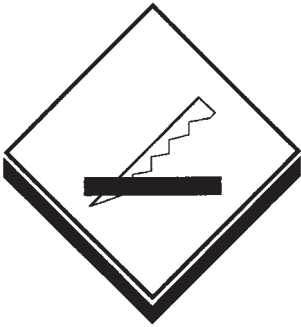


Fixing by rivet

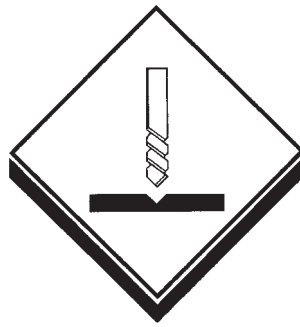


Fixing by screw

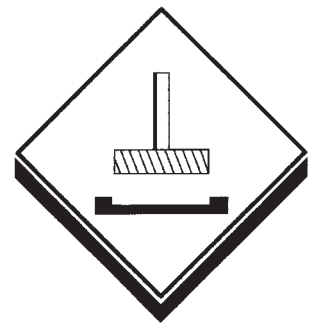
PROCESSING METHODS



Sawing



Drilling



Milling

The processing of VEKAPLAN sheets is made possible with normal machines like you would use for wood and metal processing.

Sawing

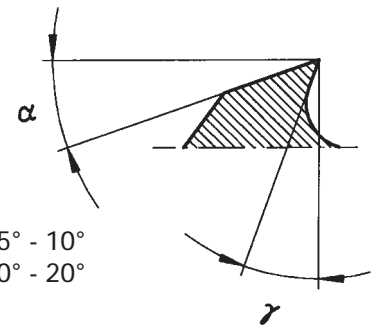
Machines: e.g. panel-dividing saw, circular bench saw

Tools: circular hand saw, band saw and angle shaped teeth forms like hollow teeth, alternating teeth, trapezoidal teeth etc.

Revolutions: 3,000 - 5,000 U/min.

Advance: 10 - 30 m/min.

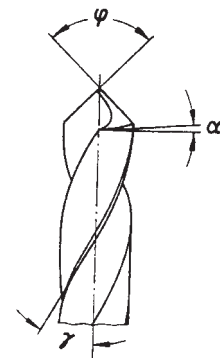
γ = tool orthogonal rake: 5° - 10°
 α = relief angle: 10° - 20°



Drilling

Tools: twist drill with plastic grinder

γ = relief angle: 8° - 10°
 α = tool orthogonal angle: 3° - 5°
 φ = point angle: 80° - 110°



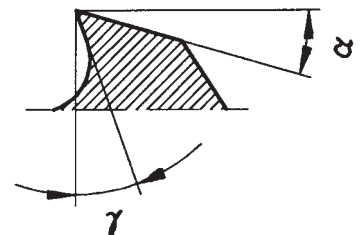
Milling

Tools: miller with plastic grinder

Revolutions: 5,000 - 25,000 U/min.

Advance: 0,6 - 1,2 m/min. dependent on type of sheet and dimension of miller

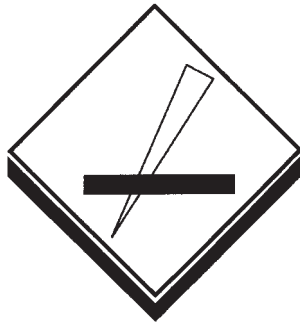
α = relief angle: 10° - 25°
 γ = tool orthogonal angle: 5° - 20°



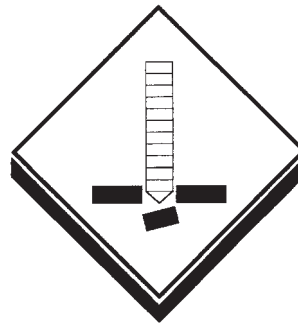
PROCESSING METHODS

Panel Saws	
<p>Striebig AG Grossmatte 26 A CH-6014 Littau Tel. +41-(0)2595353 Fax +41-(0)2595350 Internet: www.striebig.com</p>	<p>Holzma Plattenaufteiltechnik GmbH Holzmastr. 3 D-75365 Calw-Holzbronn Tel. 07053 / 69-0 Fax 07053 / 6174 Internet: www.holzma.de</p>
<p>Otto Mayer Maschinenfabrik GmbH D-72290 Lossburg/Lombach Tel. 07446 / 956030 Fax 07446 / 9560350 Internet: www.mayersaws.com</p>	<p>Holzher-Reich Spezialmaschinen GmbH Plochinger Str. 65 D-72622 Nürtingen Tel. 07022 / 702-0 Fax 07022 / 702-101 Internet: www.holzher.de</p>
Milling machines	
<p>Zünd Systemtechnik AG Industriestrasse 8 CH-9450 Altstätten Tel. +41 / 7175781-00 Fax +41 / 7175781-11 Internet: www.zund.com</p>	<p>vhf camfacture GmbH Im Marxle 3 D-72119 Ammerbuch-Altingen Tel. 07032 / 97097-0 Fax 07032 / 97097-50 Internet: www.vhf-camfacture.de</p>
<p>Aristo Graphic Systeme GmbH & Co. KG Schnackenburgallee 117 D-22525 Hamburg Tel. 040 / 54747-0 Fax 040 / 54747-191 Internet: www.aristo.de</p>	<p>Isel Automation KG Bürgerm.-Ebert-Str. 40 D-36124 Eichenzell Tel. 06659 / 981-700 Fax 06659 / 981-776 Internet: www.iselautomation.de</p>
Saw Blades and Milling Cutters	
<p>Karat Präzisionswerkzeuge GmbH Waltgeristr. 23 D-32049 Herford Tel. 05221 / 9918-0 Fax 05221 / 9918-19 Internet: www.karat.de</p>	<p>GIS Gienger Industrie Service Weimarstr. 15 D-78532 Tuttlingen Tel. 07461 / 162020 Fax 07461 / 162021 E-Mail: info@gis-tec.de</p>

PROCESSING METHODS



Cutting



Punching

The non-cutting process of the VEKAPLAN SF, K and KT sheets is possible through cutting and punching with usual sheet shears and automatic punching machines up to a thickness of 3 mm.

The process could result in a lightly rounded-off cutting edge! The cut quality is dependent on cutting tools as well as the thickness and temperature of the sheet. The process should occur at least at room temperature!

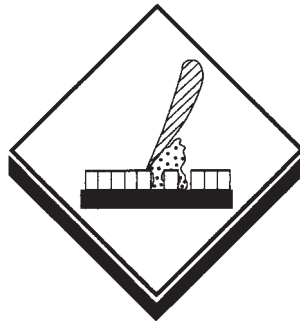
Tip!!! A warming of the sheet to 40 °C is highly recommended for the best cut quality.

Cutting Tools and Machines

Draenert Apparatebau GmbH & Co. KG
Gutenberg-Str. 15 - 17
D-73779 Deizisau
Tel. 07153 / 8217-0
Fax 07153 / 8217-60
Internet: www.dracotools.com

Trumpf GmbH & Co. KG
Johann-Maus-Str. 2
D-71254 Ditzingen
Tel. 07156 / 303-0
Fax 07156 / 303-309
Internet: www.trumpf.com

PROCESSING METHODS



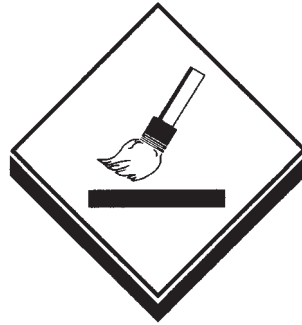
Screen Printing

The VEKAPLAN sheets S, SF, K and KT are particularly qualified for screen printing with standard, for rigid PVC suitable inks for screen printing.

Screen Printing Ink Manufacturers	Ink Designations
Marabuwerke GmbH & Co. KG Asperger Str. 4 D-71732 Tamm Tel. 07141 / 691-0 Fax 07141 / 691147 E-Mail: info@marabu-druckfarben.de	Marastar Marasoft Libragloss Libraprint Libraspeedm Libramatt
Pröll KG Treuchtlinger Str. 29 D-91781 Weißenburg Tel. 09141 / 906-0 Fax 09141 / 906-49 E-Mail: info@proell.de	Thermo Jet, Sorte P, Noriprint PS PUR-ZK Norilit U-SG Aqua-Jet FGLM NoriCure AP
Coates Screen Inks GmbH Wiederholdplatz 1 D-90451 Nürnberg Tel. 0911 / 6422-0 Fax 0911 / 6422-200 E-Mail: info@coates.de	CP, CX, HG, J, PK-Jet, RF-K, SG, Z/PVC, UVP, UVN, Multistar MLS, Musketeer MTR
Sericol GmbH Weusterstraße 9 D-46240 Bottrop Tel. 020 / 414757-0 Fax 020 / 414757-10 E-Mail: info@sericol.com	Plastijet Polyplast Mattvinyl

Screen Printing Machines	
Thieme GmbH & Co. KG Robert-Bosch-Str. 1 D-79331 Tenningen Tel. 07641 / 583-0 Fax 07641 / 583-110 E-Mail: info@thieme-products.com	Svecia Engineering AB Kumla gårdsväg 21A S-14581 Norsborg Tel. +46-(0)8-410377 00 Fax +46-(0)8-531781 00 E-Mail: public@svecia.se

PROCESSING METHODS

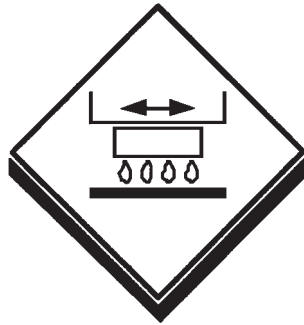


Painting

Different acrylic paints, two component-polyurethane paints as well as specially developed painting systems for PVC are suitable to paint VEKAPLAN S, SF, K and KT sheets. The paint can be applied with brushes, rollers or can be sprayed on.

Paint Manufacturers	Paint Designations
Brillux GmbH & Co. KG Weseler Str. 401 D-48163 Münster Tel. 0251 / 7188-0 Fax 0251 / 7188-350 + 360 E-Mail: info@brillux.de	MP-Dickschicht 229 Betonschutz 800 Impredur Hochglanzlack 840
ICI Paints Deco GmbH Ittapark 2 - 4 D-40721 Hilden Tel. 02103 / 205-800 Fax 02103 / 205-863 E-Mail: paints_deco_de@ici.com	Serie Meisterpreis
Spies Hecker GmbH Fritz-Hecker-Str. 47-107 D-50968 Köln Tel. 0221 / 3706-06 Fax 0221 / 3706-410 Internet: www.spieshecker.de	Permacron Serie 257 Percotex Serie 449
Peter Lacke GmbH Herforder Str. 9 D-32120 Hiddenhausen Tel. 05221 / 9625-0 Fax 05221 / 9625-44 E-Mail: info@peter-lacke.de	Pehacryl 2K UV-Schutzlack Pehacryl S 2K-indoor use Pehacryl A 2K-outdoor use
Emil Frei GmbH Am Bahnhof 6 D-78199 Bräunlingen Tel. 07707 / 151-0 Fax 07707 / 151-238 E-Mail: info@freilacke.de	Efdedur UR 1040

PROCESSING METHODS

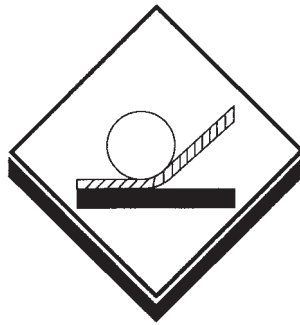


Digital printing

The digital printing of VEKAPLAN S, SF, K and KT sheets is possible with flat bed printers designed for direct printing and with appropriate ultraviolet inks.

Flat bed printer for direct digital printing	
Sericol GmbH Weusterstraße 9 D-46240 Bottrop Tel. 02041 / 4757-0 Fax 02041 / 4757-101 Internet: www.sericol.com	Durst Phototechnik Digitaltechnology GmbH Julius-Durst-Str. 11 A-9900 Lienz Tel. +43 / 48527 / 1777 Fax +43 / 48527 / 1777-50 Internet: www.durst-online.com
NUR Europe S.A. Rue du Bosquet 8 B-1348 Louvain-la-Neuve Tel. +32 (10)4828-28 Fax +32 (10)4828-29 Internet: www.nur.com	Zünd Systemtechnik AG Industriestrasse 8 CH-9450 Altstätten Tel. +41 / 7175781-00 Fax +41 / 7175781-11 Internet: www.zund.com

PROCESSING METHODS

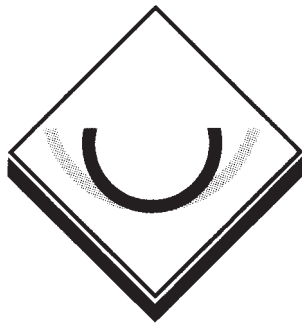


Laminating

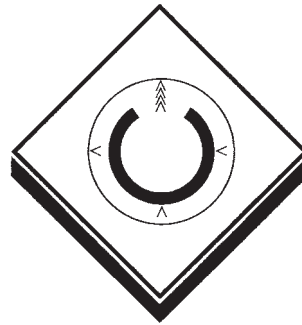
The one-side or both-side lamination of the VEKAPLAN S, SF, K and KT sheets with decorative material like foil, paper, textiles etc. is possible with transferable bond. Lamination and design are possible with standard materials for photo laminating and inscribing e.g. self-adhesive foil.

Foil Manufacturers	
Aslan Schwarz GmbH & Co. KG Oberauel 2 D-51491 Overath Tel. 02204 / 708-80 Fax 02204 / 708-50 E-Mail: info@aslan-schwarz.com	Avery Dennison Roll Materials Europe Bembergstr. 1 - 4 D-42103 Wuppertal Tel. 0202 / 490-0 Fax 0202 / 490-200 Internet: www.europe.fasson.com
Neschen AG Hans-Neschen-Str. 1 D-31675 Bückeberg Tel. 05722 / 207-0 Fax 05722 / 207-197 Internet: www.neschen.com	Mactac Deutschland GmbH Mathias-Brüggen-Str. 140 D-50829 Köln Tel. 0221 / 59789-0 Fax 0221 / 59789-10 Internet: www.mactac.com
Orafol Klebtechnik GmbH Am Biotop 2 D-16515 Oranienburg Tel. 03301 / 864-0 Fax 03301 / 864-100 Internet: www.orafol.de	

PROCESSING METHODS



Bending

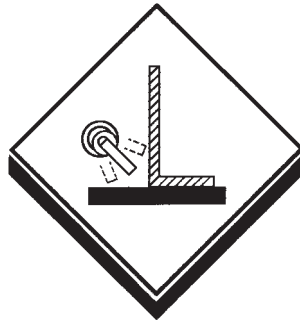


Thermal Forming

Forming, to be more precise warm forming, of the VEKAPLAN SF, K and KT sheets is possible with the already known methods for thermoplastic PVC. The different methods such as folding and bending over warm presses to the different variations of vacuum forming and stretch forming could be used according to the shape and forming temperature. Machines and equipment such as bending presses and forming presses, circulating air drying ovens and vacuum forming equipment as well as suitable tools are used according to the process.

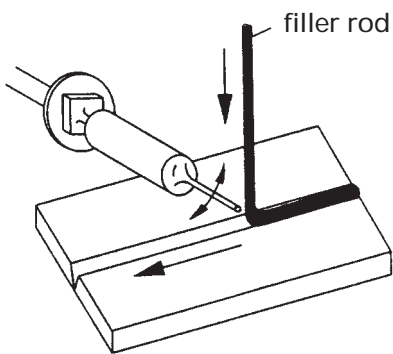
Thermal Forming Machines	Bending and Forming Machines
A. Illig Maschinenbau GmbH & Co. KG Robert-Bosch-Straße 10 D-74081 Heilbronn Tel. 07131 / 505-0 Fax 07131 / 505-303 E-Mail: info@illig.de	Reichel GmbH Am Langenberg 17 D-55218 Ingelheim Tel. 06132 / 7145-71 Fax 06132 / 7145-72 E-Mail: info@reibu.de
Geiss AG Industriestraße 2 D-96145 Sesslach Tel. 09569 / 9221-0 Fax 09569 / 9221-20 E-Mail: mail@geiss-ttt.com	Maschinenbau Wolf GmbH Robert-Bosch-Straße 13 D-73337 Bad Überkingen-Hausen Tel. 07334 / 9625-0 Fax 07334 / 9625-12 E-Mail: wolf-sanoclav-maccryl@t-online.de
Kiefel AG Industriestraße 17 - 19 D-83395 Freilassing Tel. 08654 / 78-0 Fax 08654 / 78-490 E-Mail: kiefel@kiefel.de	

PROCESSING METHODS

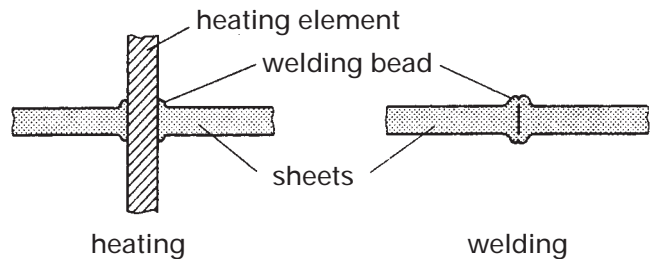


Welding

The welding of the VEKAPLAN S, SF, K and KT sheets is possible with the so-called warm gas welding process and also with the application of the diverse process of heated tool welding. To obtain the optimal welding lines the relevant factors like temperature, duration of heat and pressure exerted should be matched to the sample welding of the particular sheet type and density. Standard welding equipment and machines could be used in accordance to the applied processes.



Warm-gas Welding Movement



Heated Tool Butt Welding

Welding Machines and Equipment

Wegener GmbH
Vaalser Straße 81
D-52074 Aachen
Tel. 0241 / 70522-0
Fax 0241 / 70522-99
E-Mail: info@wegenerwelding.de

Leister Process Technologies
Riedstraße
CH-6060 Sarnen
Tel. +41 / 416 6274-74
Fax +41 / 416 6274-16
E-Mail: leister@leister.com

PROCESSING METHODS



Bonding

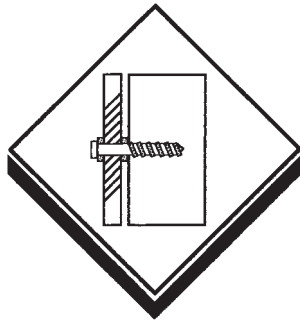
For the bonding of the VEKAPLAN sheets one below the other, a bonding solvent (cold welding) or also a reactionary bonding (e.g. the so-called super glue on a cyanacrylat basis) can usually be used.

To bond with other materials different various manufacturers have suitable adhesives in store for nearly every kind of application and material combination.

As – besides the material combination – the requirements for the finished bonding (weather resistance, chemical resistance etc.) which through the particular application are fundamentally the criteria for the adhesive choice, we recommend to ask always our advisory staff regarding questions about adhesives.

Adhesive manufacturers	
Weiss Chemie + Technik GmbH & Co. KG Hansastrasse 2 D-35708 Haiger Tel. 02773 / 815-0 Fax 02773 / 815-100 E-Mail: info@weiss-chemie.de	Jowat AG Ernst-Hilker-Straße 10 - 14 D-32758 Detmold Tel. 05231 / 749-0 Fax 05231 / 749-105 E-Mail: info@jowat.de
3M Deutschland GmbH Carl-Schurz-Straße 1 D-41453 Neuss Tel. 02131 / 14-0 Fax 02131 / 14-2649 Internet: www.mmm.com/de	Leeson Polyurethanes LTD Tachbrook Park UK-Warwick CV34 6NW Tel. +44 / 1926833367 Fax +44 / 1926881469 E-Mail: sales@lpulld.com
Klebchemie M.G.Becker GmbH & Co. KG Max-Becker-Straße 4 D-76356 Weingarten/Baden Tel. 07244 / 620 Fax 07244 / 7000 E-Mail: info@kleiberit.com	Weicon GmbH & Co. KG Königsberger Straße 255 D-48157 Münster Tel. 0251 / 9322-0 Fax 0251 / 9322-44 E-Mail: info@weicon.de

PROCESSING METHODS



Fixing by screw



Fixing by rivet

To screw and rivet the VEKAPLAN sheets standard screws for wood and metal as well as rivet types can be used for every application.

Here, however, there must be a difference between applications in indoor and outdoor areas.

Important advice will be given in the chapter "processing advice for outdoor use".

Manufacturers	
<p>EJOT Baubefestigungen GmbH In der Stockwiese 35 D-57334 Bad Laaspe Tel. 02752 / 908-0 Fax 02752 / 908-731 Internet: www.ejot.de</p>	<p>Tucker GmbH Max-Eyth-Str. 1 D-35394 Giessen Tel. 0641 / 4050 Fax 0641 / 405-300 Internet: www.emhart.com</p>
<p>SFS Stadler GmbH & Co. KG In den Schwarzwiesen 2 D-61440 Oberursel/TS Tel. 06171 / 7002-02 Fax 06171 / 79385 Internet: www.sfs.de</p>	<p>Fabricius Fastener GmbH Senefelderstraße 7 a D-33100 Paderborn Tel. 05251 / 5215-0 Fax 05251 / 5215-25 Internet: www.fabriciusfastener.de</p>
<p>GESIPA Blindniettechnik GmbH Nordendstr. 13 - 19 D-64546 Mörfelden-Waldorf Tel. 06105 / 962-0 Fax 06105 / 962-287 Internet: www.gesipa.com</p>	<p>BTI Befestigungstechnik GmbH & Co. KG Salzstr. 51 D-74653 Ingelfingen Tel. 07940 / 141-0 Fax 07940 / 141-64 Internet: www.bti.de</p>

PROCESSING METHODS FOR OUTDOOR USE

VEKAPLAN products are used in outdoor areas as displays, neon signs, graphic signs etc. As such they are exposed to extreme atmospheric and environmental conditions resulting in natural temperature variations. These influences must be taken into consideration during assembly.

1. Resistance to weather and stability

VEKAPLAN sheets are weather resistant and UV-stable so that the properties of the sheets will not change. The white coloured sheets are colour stable in every area of use. This means that changes in colour are only marginal within small tolerances (DIN 59001, grey scale level 3).

Coloured VEKAPLAN SF sheets are only partly suitable with regard to the colour-fastness for outdoor uses (at the most 4 weeks) because in the course of time lightening of the colour may occur.

2. Climate influence

VEKAPLAN sheets have been used successfully for years in Northern and Central Europe because the material composition is designed for constant climatic demands. The application of sheets in climatic areas with a considerably higher intensity of UV radiation is only a limited possibility. Individual case studies are available from our Technical Personnel.

Climate conditions in different European cities, e.g.:

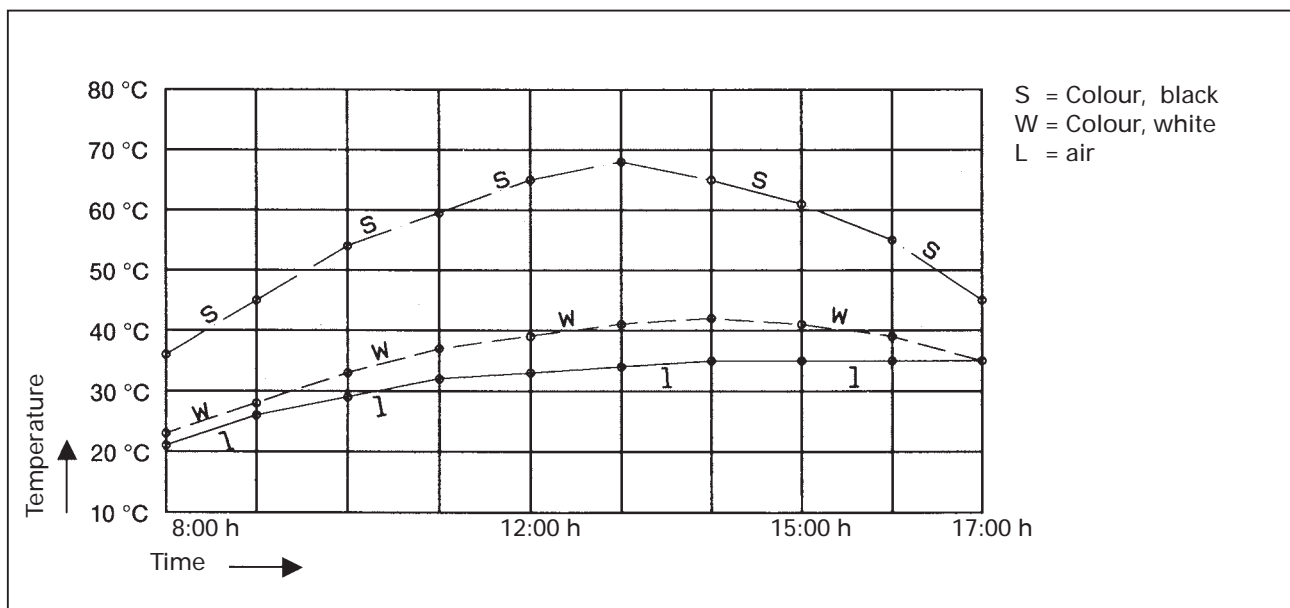
City	Country	Solar and sky radiation (kly/cm ² /year)
Paris	France	90
Munich	Germany	100
Vienna	Austria	100
Venice	Italy	110
Rome	Italy	120
Barcelona	Spain	130
Madrid	Spain	140
Athens	Greece	140
Palermo	Sicily	140

PROCESSING METHODS FOR OUTDOOR USE

3. Surface conditions

The surface condition of sheets should be taken into account for outdoor use with foil lamination, painting etc. that dark colours in direkt sunlight cause a considerable increase in sheet temperature. To avoid this the sheets used outdoors should have in addition to the graphics, a bright surface (white, bright grey, yellow etc.).

Diagram of the effect of temperature on surfaces of plastic sheets at an air temperature of approximately 35 °C:

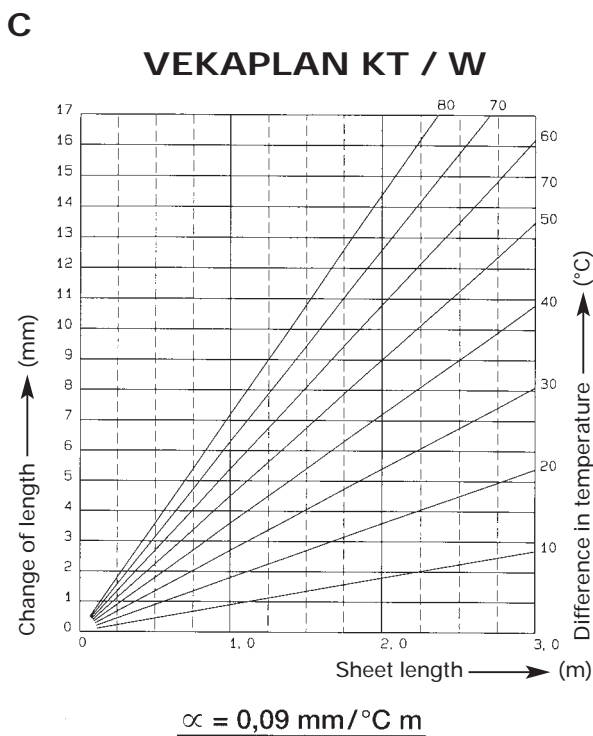
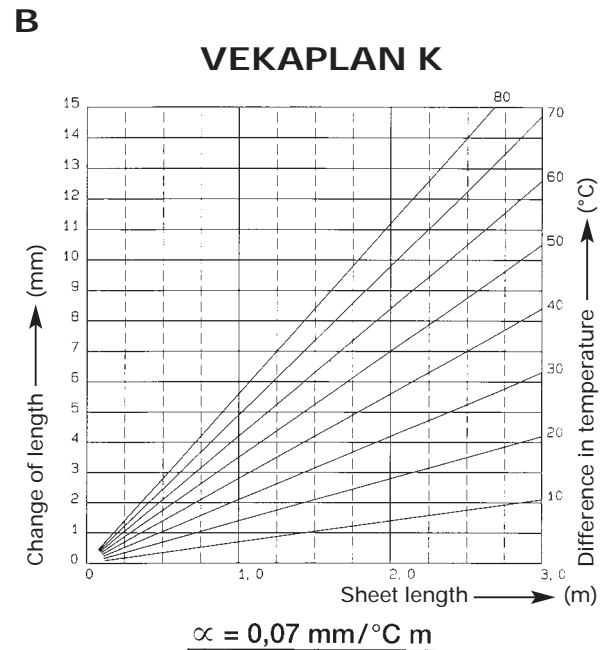
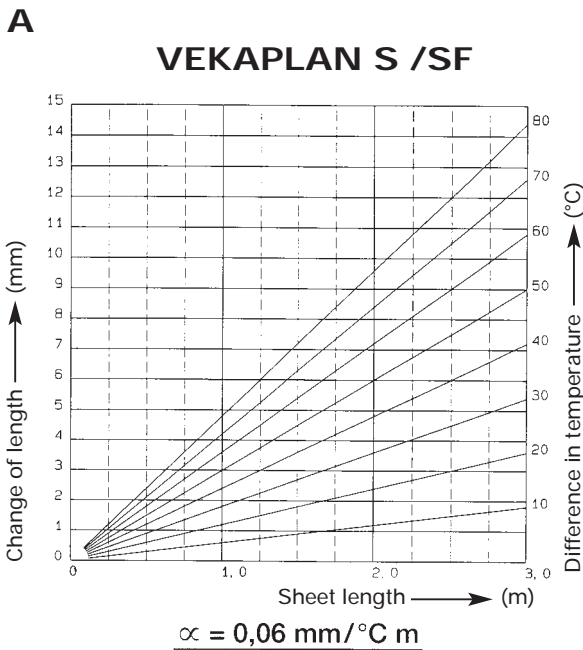


4. Temperature reaction

The PVC sheets VEKAPLAN S, SF, K, KT and W demonstrate normal temperature reactions of thermoplastic resin with regard to heat resistance and warm thermal expansion. This means that already with the assembly by using appropriate dimensions (e.g. back air vents) a later overheating of the sheet can be prevented and that the thermal expansion reaction resulting from natural temperature changes can also be considered. That's why the following advice should be adhered to for external assembly.

PROCESSING METHODS FOR OUTDOOR USE

Diagram of the expansion of VEKAPLAN sheets:



PROCESSING METHODS FOR OUTDOOR USE

5. Change in length reaction

With all materials the change in length reaction to temperature change is qualified through the specific linear thermal expansion coefficient "alpha".

VEKAPLAN-expansions coefficients:

VEKAPLAN S = 0,060 mm/C° m

VEKAPLAN SF = 0,060 mm/C° m

VEKAPLAN K = 0,070 mm/C° m

VEKAPLAN KT = 0,090 mm/C° m

VEKAPLAN W = 0,090 mm/C° m

Crucial factors for the change in length of a sheet are in addition to the expansion coefficient, the expected maximum temperature change (dependent on colour) and the sheet length. The change in length can be determined by the following formulas:

$$\Delta l = l \cdot \alpha \cdot \Delta t \text{ (mm)}$$

Δl = changes in length (mm)

l = sheet length at normal state (m)

Δt = difference in temperature (°C)

α = thermal expansion coefficient (mm/m°C)

Example of calculation:

Determination of the change of length: Δl and the change of width Δb :

sheet dimension:

$l = 2000 \text{ mm}$

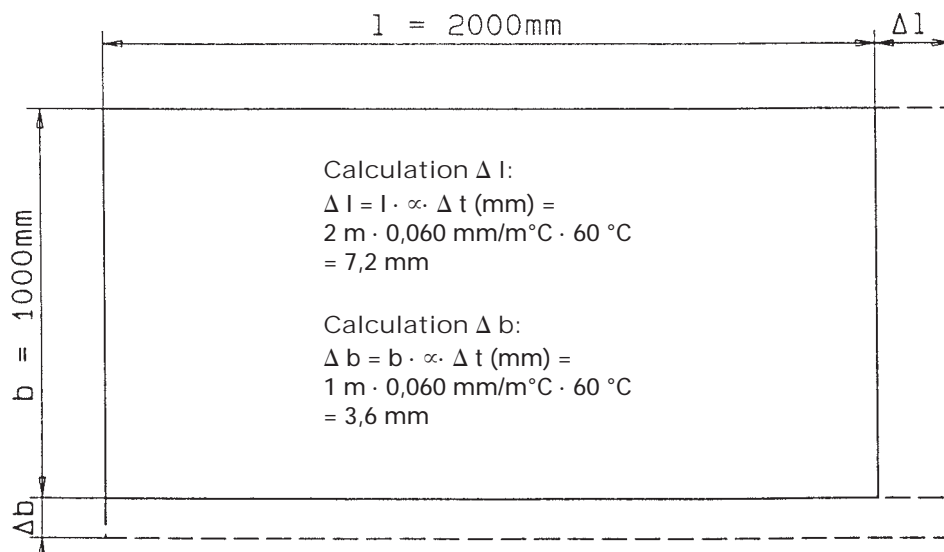
$b = 1000 \text{ mm}$

$\alpha = 0,060 \text{ mm/°C m}$

min. surface temp. = - 15 °C

max. surface temp. = + 45 °C
(white)

temp. difference 60 °C



The initial position for the sheet expansion is always the present outdoor temperature (installation temperature). For the reduction of the sheet (shrink) that minimum outdoor temperature is valid which bases on the climatic zone (Germany mean - 15 °C).

PROCESSING METHODS FOR OUTDOOR USE

Basically with building components the expansion of movement takes place from the middle of the sheet to the edge. Fixations at the edge hinder the motion of the sheets which leads inevitably into a battering. The prevention of this effect is provided for by the following mentioned fastening systems expansion joint, elongation holes.

6. Fastening with screws and bolts

- With direct fastening of the sheet, no countersunk screws or countersunk bolts should be used (pulled into the sheets)
- Tapered screws should not be inserted (pulled into the drill hole)
- Through forced tightening of screws should be avoided
- Rivet in outdoor areas should be done basically with stand of Nosetieces

Example of a calculation: Drilling

A graphic sign (white), dimension of 1500 x 1000 x 10 mm shall be fastened with screws on a construction with rear ventilation. The diameter of the screw shaft is 5 mm.

Determination of the changes in length and the drilling diameter:

Min. temperature: -15 °C

Max. temperature: +45 °C (white)

Difference in temperature: 60 °C

Solution: round hole

Changes in length in total (diagram A) = 5,4 mm

Drilling fix point (Ø) = diameter of the screw shaft + 2 mm = 7 mm

As from the fixing point the changes in length are halved to each side, the following drilling diameter is necessary:

Motional drillings (Ø) = (5,4 mm : 2) + 5 mm = 7,7 mm

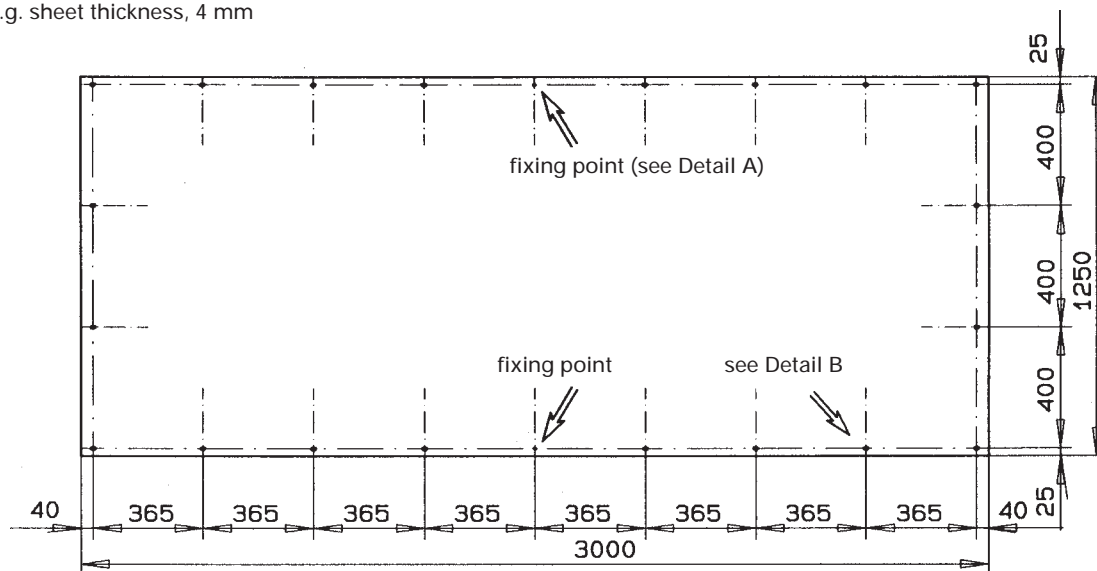
Drilling diameter = 8 mm

PROCESSING METHODS FOR OUTDOOR USE

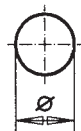
Distance between the screw connections depends on the thickness of the sheet:

Sheet thickness	Distance between the screw connections
2 mm	ca. 150 - 200 mm
3 mm	ca. 200 - 300 mm
4 mm	ca. 350 - 400 mm
5 mm	ca. 500 mm
6 mm	ca. 500 mm
8 mm	ca. 500 mm
10 mm	ca. 500 mm
19 and 24 mm	ca. 500 mm

e.g. sheet thickness, 4 mm

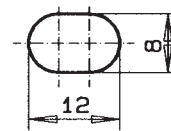


Detail A



fixing point (round hole)

Detail B



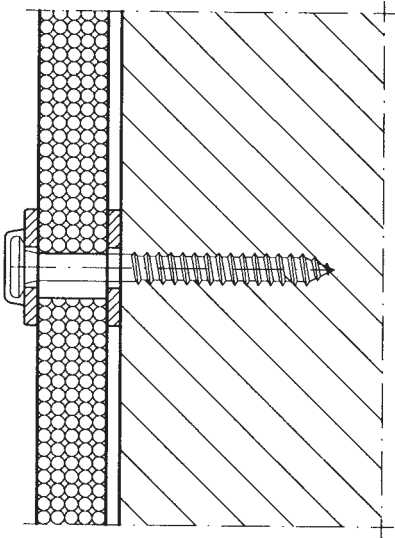
elongated hole

The spacing of holes from the edge of the sheet has to be 2,5 x bigger than the drill hole.

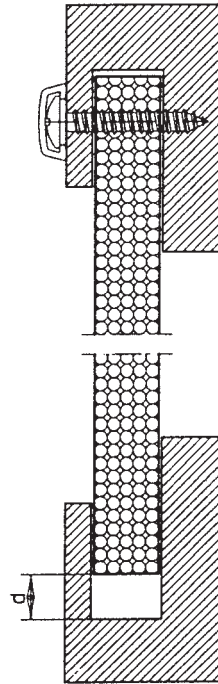
PROCESSING METHODS FOR OUTDOOR USE

Examples of installation

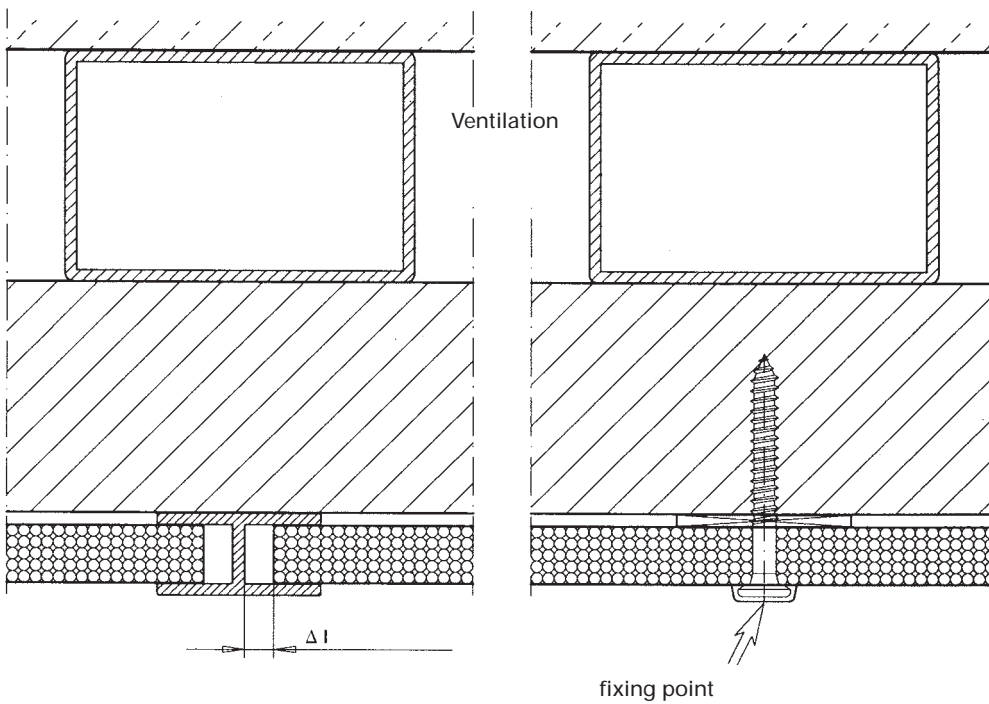
Screwing, direct



Installation in a frame, suspending



Installation, ventilation



Technical modifications subject to change without notice.

RESISTANCE TO CHEMICALS

The VEKAPLAN PVC sheets are resistant to normal disinfectants as well as acidic and alkaline cleaning agents as long as they are used in normal concentrations.

Key:

= Resistant

= Non resistant

Note:

The following laboratory results are provided in good faith and for reference purposes only. However, we cannot accept any responsibility for these figures, as the results obtained can depend on a variety of different factors and measurement

Chemical	Concentration	Temperature °C	
A			
Acetic anhydride	100 %	40	<input checked="" type="checkbox"/>
Acetic aldehyde	40 %	20	<input type="checkbox"/>
Acetic aldehyde	100 %	20	<input checked="" type="checkbox"/>
Acetic acid	up to 25 %	40	<input type="checkbox"/>
Acetic acid	25 - 60 %	40	<input type="checkbox"/>
Acetic acid	80 %	20	<input type="checkbox"/>
Acetic acid	100 %	40	<input checked="" type="checkbox"/>
Acetone	dilute	20	<input checked="" type="checkbox"/>
Adipic acid	saturated solution	40	<input type="checkbox"/>
Ammonia (gas)	100 %	40	<input type="checkbox"/>
Ammonia (solution)	saturated	40	<input type="checkbox"/>
Amyl acetate		20	<input checked="" type="checkbox"/>
Aniline	100 %	20	<input checked="" type="checkbox"/>
Aniline solution	saturated	20	<input checked="" type="checkbox"/>
Aniline hydrochloride	saturated solution	40	<input checked="" type="checkbox"/>
Anthraquinone		20	<input type="checkbox"/>
Aqua regia		40	<input type="checkbox"/>
Arsenic acid	dilute	40	<input type="checkbox"/>
Arsenic acid	80 %	40	<input type="checkbox"/>
B			
Barium oxide	dry	40	<input type="checkbox"/>

RESISTANCE TO CHEMICALS

Chemical	Concentration	Temperature °C	
Benzene	100 %	40	■
Benzene aldehyde	0.1 %	60	■
Blue water gas		20	□
Boric acid	dilute	40	□
Boric acid	saturated	40	□
Bromine (liquid)	100 %	40	■
Bromic acid	up to 10 %	40	□
Bromic acid	45 %	40	□
Bromine water		40	□
Butane		20	□
Butanol	100 %	40	□
Butyl acetate	100 %	20	■
C			
Carbamide	up to 10 %	40	□
Carbamide	33 %	40	□
Carboxylic acid (dry gas)	100 %	40	□
Carboxylic acid (wet)	all concentrations	40	□
Carboxylic acid dissolved under pressure	saturated	20	□
Ceryl alcohol	100 %	40	□
Chlorobenzene		20	■
Chlorine gas (wet)	0.5 %	20	□
Chlorine gas (dry)	100 %	20	□
Chloroform		20	■
Chloric acid	30 % 19° H	40	□
Chloric acid	over 30 %	40	□
Chlorine water	saturated	40	□
Chlorine water	12° 5	40	□
Chlorine water	48 %	40	□
Chromic acid solution	up to 50 %	40	□
City gas		20	□
Citric acid	up to 20 %	40	□
Citric acid	saturated	40	□
Cresylic acid	up to 100 %	60	■
Cuprammonia compounds	commercial	20	□
Cyclohexanol	100 %	40	■
Cyclohexanone	100 %	40	■

RESISTANCE TO CHEMICALS

Chemical	Concentration	Temperature °C	
D			
Developer		40	<input type="checkbox"/>
Dextrin, solution	18 %	20	<input type="checkbox"/>
Dextrin, solution	saturated	20	<input type="checkbox"/>
Dichloroethane	100 %	40	<input checked="" type="checkbox"/>
E			
Ethyl acetate	100 %	20	<input checked="" type="checkbox"/>
Ethyl ether	100 %	20	<input type="checkbox"/>
Ethyl chloride		20	<input checked="" type="checkbox"/>
Ethylene dichloride	100 %	20	<input checked="" type="checkbox"/>
Ethyl glycol (Callosolve)		40	<input type="checkbox"/>
Ethylene oxide	100 %	40	<input checked="" type="checkbox"/>
F			
Fatty acids	100 %	40	<input type="checkbox"/>
Formaldehyde	dilute	40	<input type="checkbox"/>
Formaldehyde	40 %	40	<input type="checkbox"/>
Furfural		40	<input checked="" type="checkbox"/>
Formic acid	up to 50 %	40	<input type="checkbox"/>
Formic acid	up to 100 %	40	<input type="checkbox"/>
G			
Glucose	saturated	40	<input type="checkbox"/>
Glykol	commercial solution	40	<input type="checkbox"/>
Glykol	10 %	40	<input type="checkbox"/>
Glycerine	all concentrations	40	<input type="checkbox"/>
H			
Heavy benzine solvents		40	<input type="checkbox"/>
Heptane		40	<input type="checkbox"/>
Hexanol, tertiary	100 %	40	<input type="checkbox"/>
Hydroxylamine sulphate	12 %	40	<input type="checkbox"/>
Hydrochloric acid, gas	all concentrations	40	<input type="checkbox"/>
Hydrogen peroxide	up to 20 %	40	<input type="checkbox"/>
Hydrogen peroxide	up to 30 %	40	<input type="checkbox"/>

RESISTANCE TO CHEMICALS

Chemical	Concentration	Temperature °C	
Hydrogen, gas	100 %	40	<input type="checkbox"/>
Hydrogen tetrachloride	100 %	40	<input checked="" type="checkbox"/>
Hydrofluoric acid, traces		40	<input type="checkbox"/>
I			
Iodine		40	<input type="checkbox"/>
K			
Kerosine / petroleum		40	<input type="checkbox"/>
L			
Lactic acid	up to 10 %	40	<input type="checkbox"/>
Lactid acid	90 %	20	<input type="checkbox"/>
Linseed oil		40	<input type="checkbox"/>
M			
Methyl ethyl ketone		40	<input checked="" type="checkbox"/>
Methyl alcohol	100 %	40	<input type="checkbox"/>
Methylbenzene (toluene)	100 %	40	<input checked="" type="checkbox"/>
Methyl chloride	100 %	20	<input checked="" type="checkbox"/>
Methylene chloride	100 %	20	<input checked="" type="checkbox"/>
Methyl sulphuric acid	all concentrations	40	<input type="checkbox"/>
Methyl sulphate		40	<input type="checkbox"/>
Monochloroacetylic acid	85 %	40	<input type="checkbox"/>
Monochloroacetylic acid	100 %	40	<input type="checkbox"/>
N			
Napthalene	concentrated	40	<input checked="" type="checkbox"/>
Nitrate gas	concentrated	60	<input checked="" type="checkbox"/>
Nitric acid	up to 30 % - 23° B	40	<input type="checkbox"/>
Nitric acid	30 - 50 % 23-25° N	40	<input type="checkbox"/>
Nitric acid	98 % - 40° B	20	<input checked="" type="checkbox"/>
Nitrate products, traces		40	<input type="checkbox"/>
O			
Oils and greases		40	<input type="checkbox"/>
Oleic acid		40	<input type="checkbox"/>
Oxalic acid	dilute	40	<input type="checkbox"/>
Oxalic acid	concentrate	40	<input type="checkbox"/>
Oxygen	fully concentrated	40	<input type="checkbox"/>
Ozone	100 %	20	<input type="checkbox"/>

RESISTANCE TO CHEMICALS

Chemical	Concentration	Temperature °C	
P			
Paper adhesive		40	<input type="checkbox"/>
Paraffin emulsion		40	<input type="checkbox"/>
Permutite-softened water		40	<input type="checkbox"/>
Phenol / carbolic acid	up to 90 %	60	■
Phenylhydrazine	100 %	40	■
Phosgene gas / liquid carbon oxychloride	100 %	40	■
Phosgene gas / gaseous carbon oxychloride	100 %	20	<input type="checkbox"/>
Phosphate trichloride		40	■
Photographic emulsion		40	<input type="checkbox"/>
Photographic fixing agents		40	<input type="checkbox"/>
Phosphorus, white		20	<input type="checkbox"/>
Piric acid	1 %	20	<input type="checkbox"/>
Potassium solution	up to 40 %	40	<input type="checkbox"/>
Potassium solution	50 - 60 %	40	<input type="checkbox"/>
Propane, liquid	100 %	20	<input type="checkbox"/>
Propane, gas	100 %	20	<input type="checkbox"/>
Q			
Quicksilver		40	<input type="checkbox"/>
R			
Residual gas containing sulphuric acid	all concentrations	40	<input type="checkbox"/>
S			
Salts of Aluminium	suspension or dilute	40	<input type="checkbox"/>
Salts of Ammonia	concentrated	40	<input type="checkbox"/>
Salts of Antimony	concentrated	40	<input type="checkbox"/>
Salts of Barium	concentrated	40	<input type="checkbox"/>
Salts of Bismuth	concentrated	40	<input type="checkbox"/>
Salts of Calcium	concentrated	40	<input type="checkbox"/>
Salts of Chromium	concentrated	40	<input type="checkbox"/>
Salts of Copper	concentrated	40	<input type="checkbox"/>
Salts of Iron	concentrated	40	<input type="checkbox"/>
Salts of Lead	concentrated	40	<input type="checkbox"/>
Salts of Nickel	concentrated	40	<input type="checkbox"/>

RESISTANCE TO CHEMICALS

Chemical	Concentration	Temperature °C	
Salts of Potassium	concentrated	40	<input type="checkbox"/>
Salts of Silver	concentrated	40	<input type="checkbox"/>
Salts of Soda	concentrated	40	<input type="checkbox"/>
Salts of Tin	concentrated	40	<input type="checkbox"/>
Salts of Zinc	concentrated	40	<input type="checkbox"/>
Seawater		40	<input type="checkbox"/>
Silver solution		40	<input type="checkbox"/>
Smoke from dry combustion		40	<input type="checkbox"/>
Soap solution	fully concentrated	40	<input type="checkbox"/>
Soda solution	40 %	40	<input type="checkbox"/>
Soda solution	50 - 60 %	40	<input type="checkbox"/>
Stearic acid	100 %	40	<input type="checkbox"/>
Sulphuric acid	up to 40 % - 34° B	40	<input type="checkbox"/>
Sulphuric acid	40 - 80 % - 34 - 61° B	40	<input type="checkbox"/>
Sulphuric acid	80 - 95 % - 61 - 65° B	40	<input type="checkbox"/>
Sulphuric acid	95 % - 66° B	40	<input type="checkbox"/>
T			
Tartaric acid	up to 10 %	40	<input type="checkbox"/>
Tartaric acid	saturated	40	<input type="checkbox"/>
Tetraethyl lead	100 %	20	<input type="checkbox"/>
Tetrahydrofuran		40	<input checked="" type="checkbox"/>
Thionyl chloride		20	<input checked="" type="checkbox"/>
Triethanolmine	100 %	20	<input type="checkbox"/>
Triethylamine		40	<input type="checkbox"/>
Tributyl phosphate		40	<input checked="" type="checkbox"/>
Trichloroethene	100 %	20	<input checked="" type="checkbox"/>
Turpentine spirits		40	<input type="checkbox"/>
V			
Vegetable tannage extracts	solution	20	<input type="checkbox"/>
Vinyl acetate	100 %	20	<input checked="" type="checkbox"/>
W			
Water		40	<input type="checkbox"/>
Wine vinegar		40	<input type="checkbox"/>
Wine, red or white		20	<input type="checkbox"/>

Our team of application technicians is looking forward to answering your technical questions because

Our goal is your success!

Stephan Hauser
Technical Representative
with the exception of Austria
and Germany

 **0049 2526 29-2080**
E-Mail: shauser@veka.com

Dirk Pottek
Technical Representative
for Germany and Austria

 **0049 2526 29-2085**
E-Mail: dpottek@veka.com



VEKA AG

Postfach 1262, D-48319 Sendenhorst · Dieselstraße 8, D-48324 Sendenhorst
☎ 02526 29-0 · 📠 02526 29-3710 · www.veka.com · www.vekaplan.de

Ein Unternehmen der Laumann Gruppe