Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-19/0859 of 23 November 2020

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Dachlichtband Alphaglas gewölbt Typ MS 70
Product family to which the construction product belongs	Self supporting translucent roof kits
Manufacturer	Deutsche Everlite GmbH Am Kessler 4 97877 Wertheim DEUTSCHLAND
Manufacturing plant	Deutsche Everlite GmbH Am Kessler 4 97877 Wertheim DEUTSCHLAND
This European Technical Assessment contains	57 pages including 49 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 220089-00-0401

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Specific Part

1 Technical description of the product

1.1 Kit description and setup

The "Alphaglas gewölbt Typ MS 70" is a self-supporting translucent roof kit made up of components which are factory-made and assembled on site.

The static system of the "Alphaglas gewölbt Typ MS 70" complies with the category "Curved roof systems with additional bearing profiles" as listed in section 2.2.5.1 a) of the EAD 22089-00-0401[1].

The roof kit comprises 2.10 m-wide arched translucent PC multi-wall sheets which are positioned on curved bearing profiles and protected against uplift loads by covering profiles. The sheets are mounted on the eaves side in an impost profile. The multi-wall sheets are abutted along their longitudinal edges via a bearing profile. For the sheets one (for double-span systems) or three (for four-span systems) additional bearing profiles are arranged as intermediate supports parallel to the end arches.

The following components may be part of the curved self-supporting translucent roof kit:

"Alphaglas gewölbt Typ MS 70"

- translucent polycarbonate (PC) multi-wall sheets of thickness 10 mm (only used as PC 10+10), 16 mm (PC 16) or 20 mm (PC 20); they can also be used in stacks of two skins (PC 10+10, PC 16+10, PC 20+10)
- 2 - 4 mm solid sheets made from polycarbonate (optionally arranged under a multi-wall sheet),
- glass fibre mat (optionally arranged between the multi-wall sheets)
- bearing and covering profiles made of aluminium,
- aluminium impost profiles
- mounting angle, made of aluminium or GRP
- fixing brackets made of aluminium,
- sealing profiles,
- connecting devices.

The components and the system setup of the product are given in Annexes A 1 to A 4.

The material values, dimensions and tolerances of the roof kit not indicated in the annexes shall correspond to the values laid down in the technical documentation[2] of this European technical assessment.

[1] EAD 22089 00-0401 Self supporting translucent roof kits with covering made of plastic sheets; edition march 2019

[2] The technical documentation comprises all information of the holder of this ETA necessary for the production, installation and maintenance of the roof kit; these are in particular the structural analysis, design drawings and the manufacturer's installation instructions. The part to be treated confidentially is deposited with Deutsches Institut für Bautechnik

1.1.1 Multi-wall sheets

The following multi-wall sheets made from polycarbonate (PC) in accordance with the harmonised European standard EN 16153[3] may be used.

Tabelle 1: PC-sheets

Manufacturer	Trade name	Sheet height [mm]	Annex
CORPLEX, Kaysersberg F – Kaysersberg	Akyver Sun Type 10/4W-7 1750	10	A 4.1
Exolon Group S.p.A. IT – Nera Montoro	Makrolon multi UV 4/10-6	10	A 4.2
dott.gallina s.r.l. IT – La Loggia	Policarb 10mm 5w	10	A 4.3
dott.gallina s.r.l. IT – La Loggia	Policarb 10mm 4w	10	A 4.4
Stabilit Suisse S.A. CH – Stabio	Makrolux Multiwall LL 4W-10	10	A 4.5
Sabic innovative plastics B.V. NL – Nera Montoro	Lexan Thermoclear LT2UV105R175	10	A 4.6
CORPLEX, Kaysersberg F – Kaysersberg	Akyver Sun Type 16/7W-12 2700	16	A 4.7
Exolon Group S.p.A. IT – Nera Montoro	Makrolon multi UV 7/16-14	16	A 4.8
dott.gallina s.r.l. IT – La Loggia	Policarb 16mm 7w	16	A 4.9
Stabilit Suisse S.A. CH – Stabio	Makrolux Multiwall LL 7W-16	16	A 4.10
Stabilit Suisse S.A. CH – Stabio	Makrolux Multiwall HC-16 mm	16	A 4.11
CORPLEX, Kaysersberg F – Kaysersberg	Akyver Sun Type 20/7W-12	20	A 4.12
Exolon Group S.p.A. IT – Nera Montoro	Makrolon multi UV 7/20-14	20	A 4.13
Stabilit Suisse S.A. CH – Stabio	Makrolux Multiwall LL 7W-20	20	A 4.14

The multi-wall sheets have unfilled hollow chambers and weatherproofing on the outer surfaces which are unmistakably identified.

1.1.2 Optional (full-surface) covering supplement

1.1.2.1 Solid sheet PC

The inner 2 - 4 mm - thick solid sheet is made of polycarbonate (PC) with a weight per unit area of 2,4 - 4,8 kg/m² in accordance with the harmonised European standard EN 16240[4] by extrusion.

[3] EN 16153:2015-05 Light transmitting flat multiwall polycarbonate (PC) sheets for internal and external use in roofs, walls and ceilings - Requirements and test methods

[4] EN 16240:2014-03 Light transmitting flat solid polycarbonate (PC) sheets for internal and external use in roofs, walls and ceilings - Requirements and test methods

1.1.2.2 Textile glass mat

A layer of textile glass mat with a weight per unit area of Type 1: 120 g/m² (± 10 g/m²) or Type 2: 170 g/m² (± 10 g/m²) may be arranged between the multi-wall sheets. It corresponds to the specifications deposited with Deutsches Institut für Bautechnik.

1.1.3 Bearing profiles and covering profiles

The aluminium profiles are made from the aluminium alloy EN AW-6060 T66 or T64 in accordance with EN 755-2[5] and have the dimensions given in Annex A 3.1 of the ETA. The Bearing profiles and covering profiles are pre-bent according to the intended radius.

1.1.4 Impost profiles

The impost profile at the eaves are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2. They vary according to the type of covering and have the dimensions given in Annex A 3.2 of the ETA.

1.1.5 Mounting angle

The mounting angle 63x43x3 is made of textile glass reinforced unsaturated polyester resin (GRP) of resin group 1B according to EN 13121-1[6] The glass mass percentage is 68.7 % on average, the weight per length is nominally 595 g/ m.

Optionally, an aluminium mounting bracket 60x40x3 can be used, which is made of aluminium EN AW 6060, condition T66 according to EN 755-2:2016.

The dimensions are given in Annex A 3.3 of the ETA.

In the areas between the bearing profiles, the mounting angle can optionally be insulated with EPS 032 DEO dh in accordance with EPS-EN13163[7].

1.1.6 Fixing brackets

The fixing brackets at the eaves are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2 and have the dimensions given in Annex A 3.2 of the ETA.

1.1.7 Sealing profiles

The sealing profiles are made from ethylene/ propylene terpolymer (EPDM) according to DIN 7863-1[8]. Sealing profiles I are used in the cover profiles with a Shore A hardness of 60 ±5 according to DIN ISO 7619-1: 2012[9]. and sealing profiles II in the impost profiles with a Shore A hardness of 70 ±5 according to DIN ISO 7619-1: 2012. The sealing profiles have the dimensions given in Annex A 3.3.

1.1.8 Connecting devices

The connection between the mounting angle and the impost profile (see Annex A 2.4) is made structurally with rivets with a rivet spacing e ≤ 500 mm. The connection of the fixing bracket with the bearing profile 70 and the covering profile 70 (see Annex A 2.3) is made with a pair of screws and washers Type FABA BZ Ø 6,3 x L in accordance with ETA-10/0184 or Type E-X-BZ 6,3 x L in accordance with ETA-13/0181.

5	EN 755-2:2016-10	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties
6	EN 13121-1:2003	GRP tanks and vessels for use above ground - Part 1: Raw materials; Specification conditions and acceptance conditions
7	EN 13163:2012+A2:2016	Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification
8	DIN 7863-1:2019-12	Elastomer glazing and panel gaskets for windows and claddings - Technical delivery conditions - Part 1: Non cellular elastomer glazing and panel gaskets
9	DIN ISO 7619-1:2010	Rubber, vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)

The connection of covering profile 40x2 through the PC-sheets with the bearing profile 40x40x3 (see Annex A 2.4) is made with three symmetrically arranged screws and washers Type FABA BZ Ø 6,5 x 50 in accordance with ETA-10/0184 or Type E-X-A 6,5 x 50 in accordance with ETA-13/0181.

1.1.9 "Alphaglas gewölbt Typ MS 70" roof kit

The roof kit is made up of the components described in Sections 1.1.1 and 1.1.3 to 1.1.8. and optional 1.1.2.

Depending on the covering used, the roof kit may be used in the following support systems:

Table 2: Combinations of the support system

Covering	Multi-wall sheet as per Annex	Support system	
		2- span / $a_p \leq 1060$	4- span / $a_p \leq 530$
PC 10 + PC 10	A 4.1 bis A 4.6 (2x identical PC sheets)	x	x
PC 16	A 4.7 to A 4.11	x	–
PC 16 (outside) + PC 10	A 4.7 + A (4.1, 4.3, 4.4)	x	x
	A 4.8 + A 4.2	x	x
	A 4.9 + A (4.1, 4.3, 4.4)	x	x
	A (4.10 or 4.11) + A 4.5	x	x
PC 20	A 4.12 to A 4.14	x	–
PC 20 (outside)+ PC 10	A 4.12 + A (4.1, 4.3, 4.4)	x	x
	A 4.13 + A 4.2	x	x
	A 4.14 + A 4.5	x	x

Table 3: Reaction to fire of the components

Component	Reaction to fire
Multi-wall sheets/ coverings	Class in accordance with the DoP of EN 16153/ Annex A 4
Solid sheet PC	Class E in accordance with the DoP of EN 16240
Textile glass mat	Class C-s3,d2 in accordance with EN 13501-1[10]
Mounting angle GRP	Class E in accordance with EN 13501-1
EPS optional acc. to EN 13163	Class E in accordance with EN 13501-1
Sealing profile	No contribution to fire spread in accordance with EOTA TR 021 (Version June 2005)
Bearing and covering profiles	Class A1 as per EN 13501-1 (in accordance with EC Decision 96/603/EC (as amended) without the need for further testing)
Impost profiles	
Mounting angle Aluminium	
Fixing brackets	
Connecting devices	

[10] EN 13501-1:2018 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

2 Specification of the intended use in accordance with the applicable European Assessment Document

The self-supporting translucent roof kit may be used in the roof area for open or closed building structures. The multi-wall sheets may be combined to form continuous rooflights of any length with rectangular bases. When installed, the roof kit is not walkable and it may not be used for bracing of the roof support structure.

The performance data given in Section 3 are only valid if the roof kit is used in compliance with the specifications and the conditions given in Annex A, B, C and D.

The verifications and assessment methods on which this European Technical Assessment (hereinafter referred to as 'ETA') is based lead to the assumption of a working life of the roof kit of at least ten years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as means for choosing the right products in relation to the expected economically reasonable working life of the structure.

3 Performance of the product

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Fire performance in case of external fire exposure for: "PC 10+10" with textile glass mat Type 1 between the sheets * "PC 16+10" with textile glass mat Type 1 between the sheets * "PC 20+10" with textile glass mat Type 2 between the sheets *	Broof (t1) in accordance with EN 13501-5[11]
Fire performance in case of external fire exposure except for the above mentioned	No performance assessed
Reaction to fire	Class E in accordance with EN 13501-1
Resistance to fire	No performance assessed
* applies to PC-sheets according to the following annexes: PC 10 (d = 10 mm): A 4.1, A 4.3, A 4.4, A 4.5; PC 16 (d = 16 mm): A 4.7, A 4.9, A 4.10, A 4.11; PC 20 (d = 20 mm): A 4.12	

3.2 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Watertightness and condensation	Category 1 (no leaks with no differential air pressure) up to inclination from the horizontal longitudinal and transverse: 15° Design details as per information deposited with DIBt

3.3 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic structural resistance of the multi-wall sheets to forces (actions) resulting from downward loads and uplift loads [kN/m²]	See Annex B 3.1
Characteristic structural resistance of the mounting angle (GRP) to forces (actions) resulting from downward loads [kN]	See Annex B 2.3
Characteristic structural resistance of the fasteners [kN]	See Annex B3.2/B3.3

[11] EN 13501-5:2016 Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests

Essential characteristic	Performance
Consideration of the effect of load duration	See Annex B 1.2/ B2.2
Consideration of ageing and environmental effects	See Annex B 1.3
Consideration of thermal effects	See Annex B 1.3
Values for characteristic structural resistance of aluminium bearing and covering profiles	In accordance with structural calculation.
Resistance to damage by impact loads with a soft object	SB 0 (no requirement)
Resistance to impact loads from a hard object (250 g)	Passed in accordance with EN 16153

3.4 Protection against noise (BWR 5)

No performance assessed

3.5 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance	See Annex C
Air permeability	No performance assessed
Radiation Properties – Light transmittance – Solar direct transmittance – Total solar energy transmittance	See declaration of performance according to EN 16153

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

According to the European Assessment Document (EAD) 220089-00-0401, the legal basis is as follows: 98/600/EC

The system to be applied is: 3

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

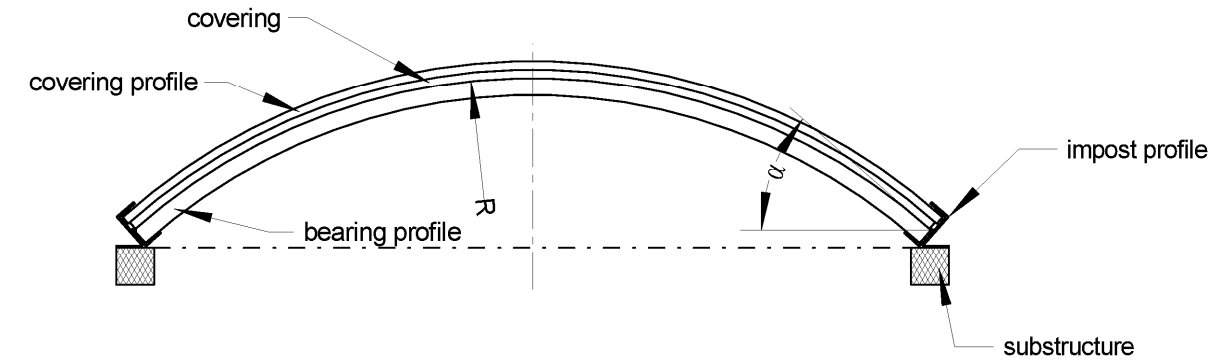
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

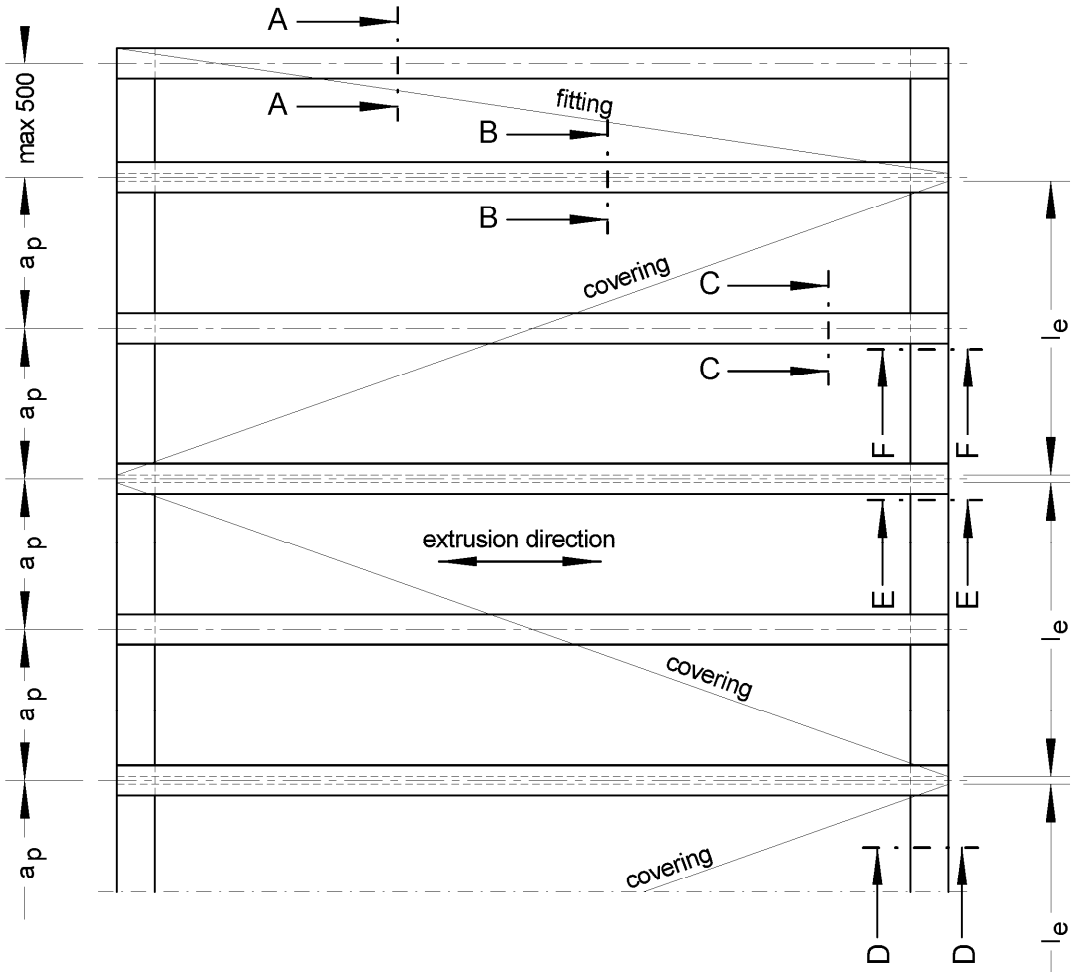
Issued in Berlin on 23 November 2020 by Deutsches Institut für Bautechnik

Dipl.-Ing. Renée Kamanzi-Fechner
Head of Section

beglaubigt:
Wachner

Deutsches Institut für Bautechnik DIBt





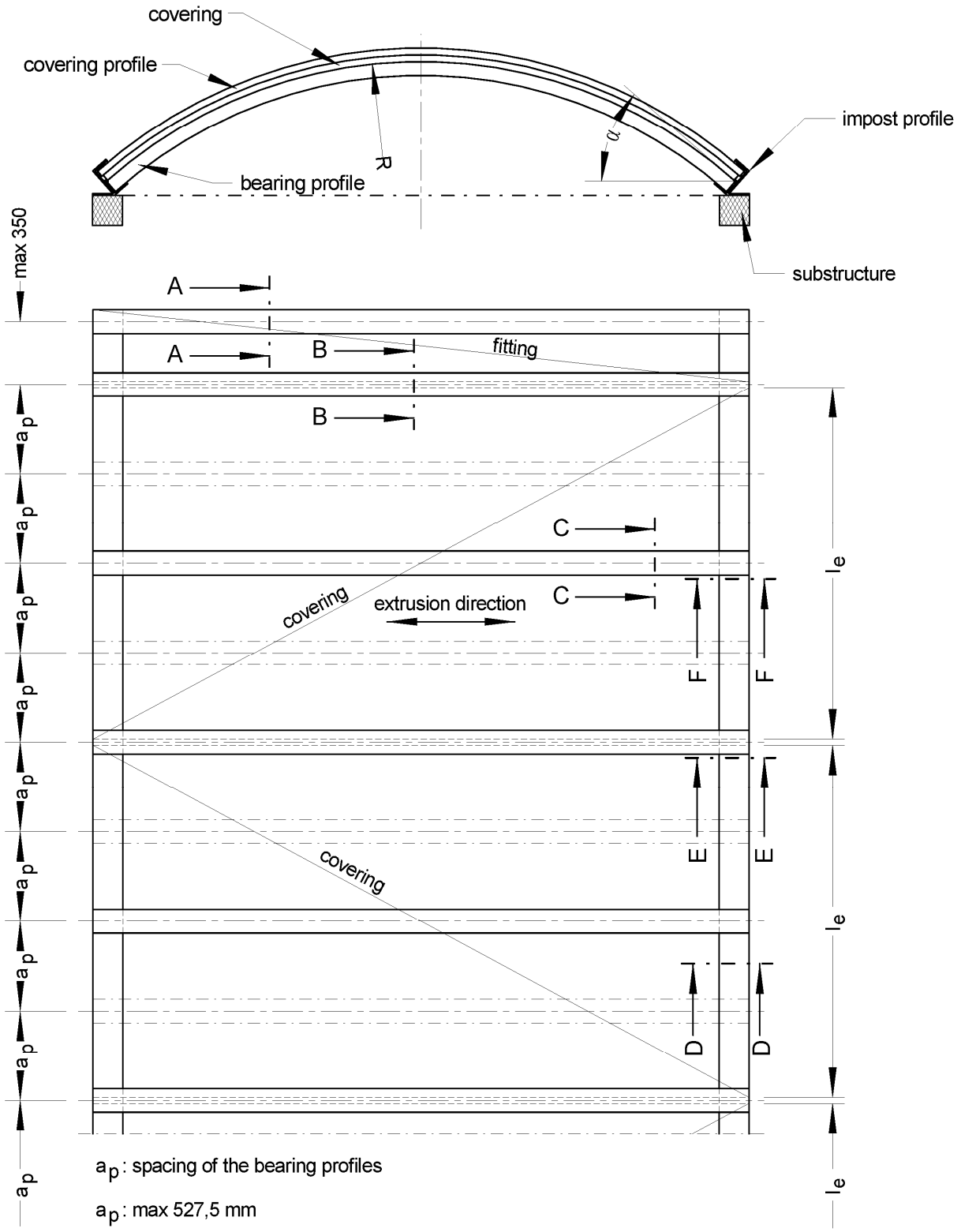
a_p: spacing of the bearing profiles

a_p: max 1055 mm

l_e: width of covering

schematic view

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 1.1
System overview 2-span-system	



a_p: spacing of the bearing profiles

a_p: max 527,5 mm

l_e: width of covering

schematic view

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 1.2
System overview 4-span-system	

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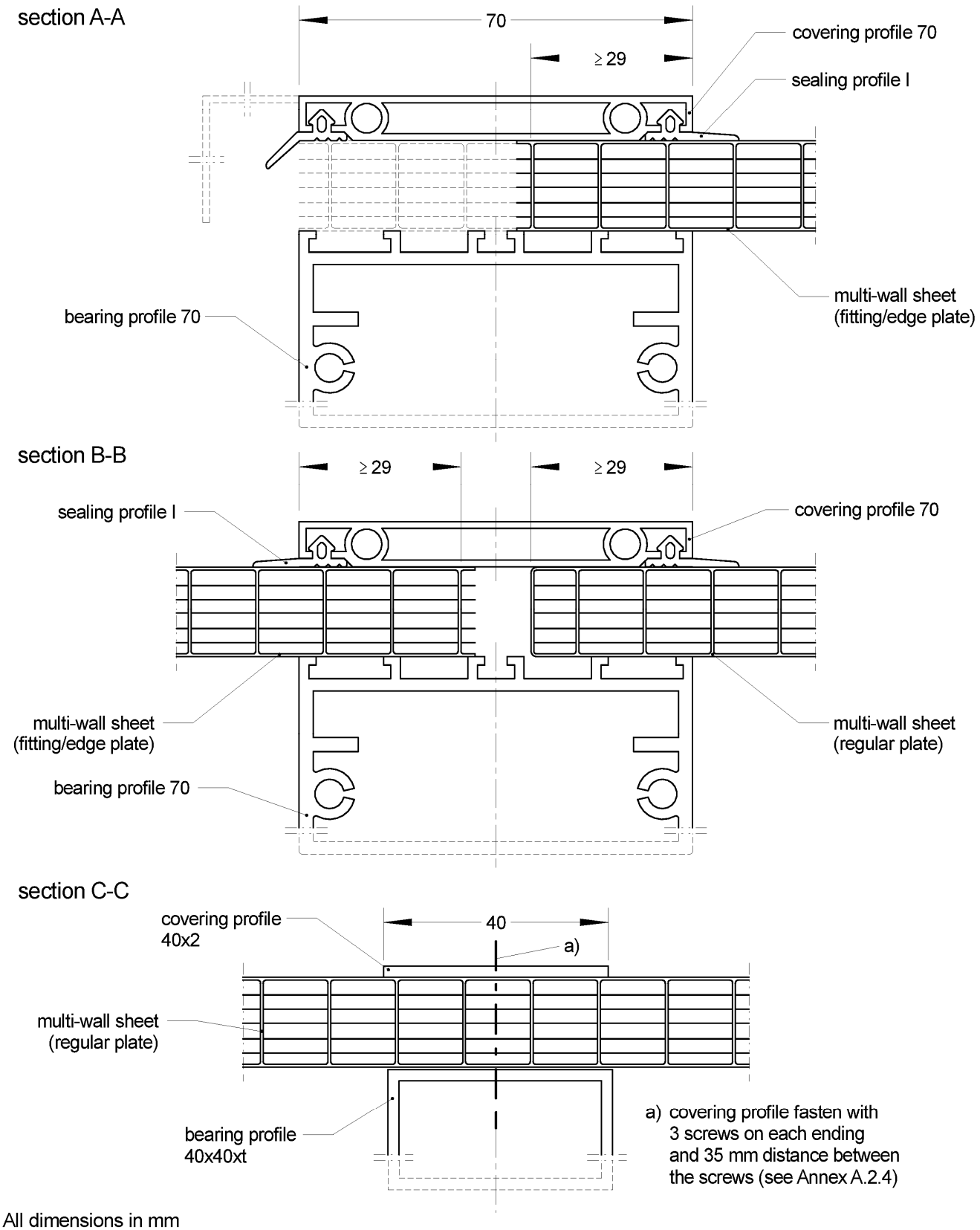

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.1.1
Combinations of arch profiles, multiple-span-systems sections A-A, B-B and C-C for the type: "PC 16"	

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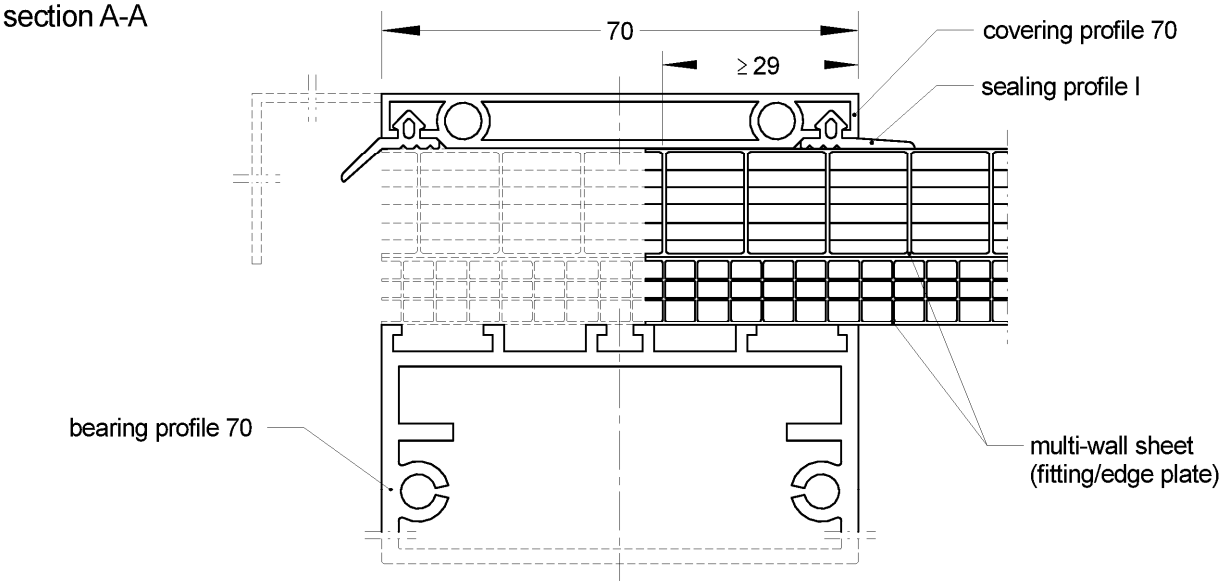
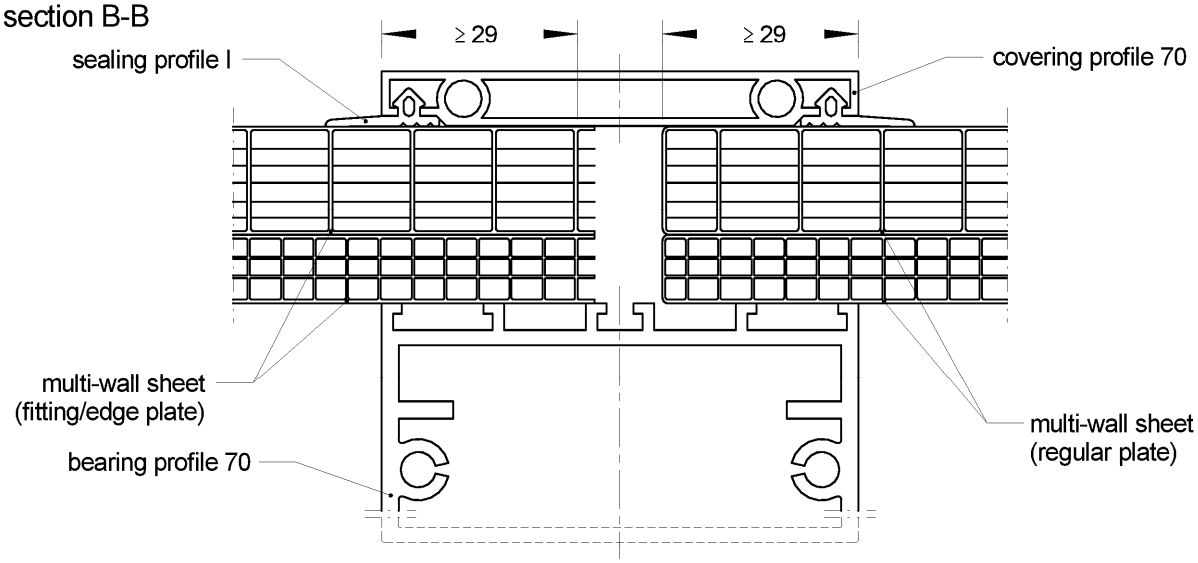
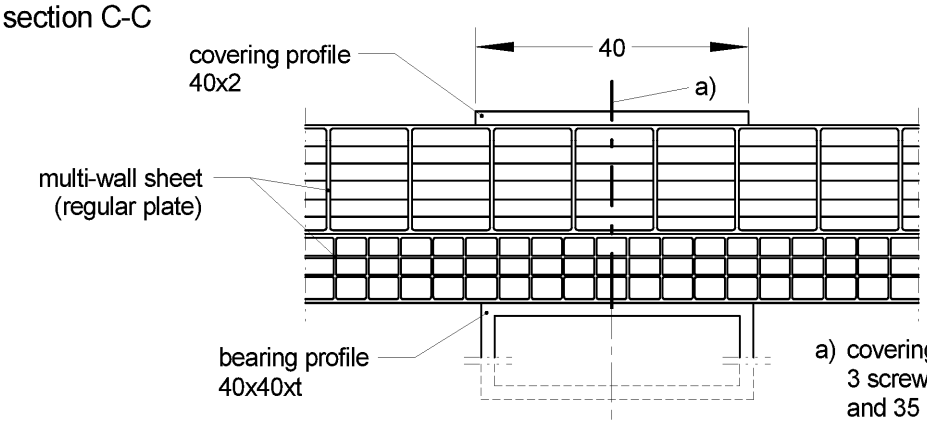
section A-A



section B-B



section C-C



a) covering profile fasten with 3 screws on each ending and 35 mm distance between the screws (see Annex A.2.4)

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.1.2
Combinations of arch profiles, multiple-span-systems sections A-A, B-B and C-C for the type: "PC 10+10, PC 16+10 and PC 20+10"	

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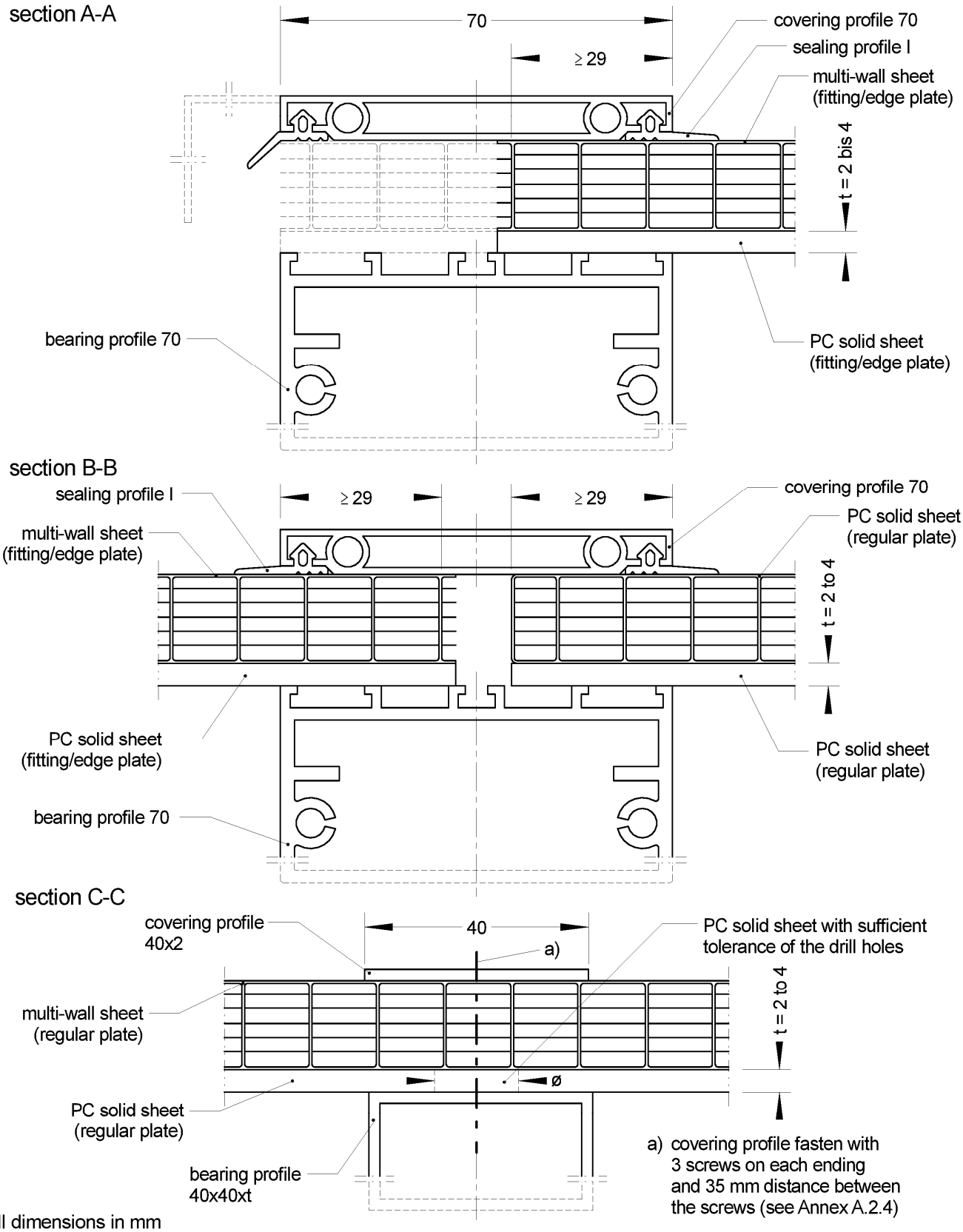

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.1.3
Combinations of arch profiles, multiple-span-systems sections A-A, B-B and C-C for the type: "PC 16+2, PC 16+3 and PC 16+4"	

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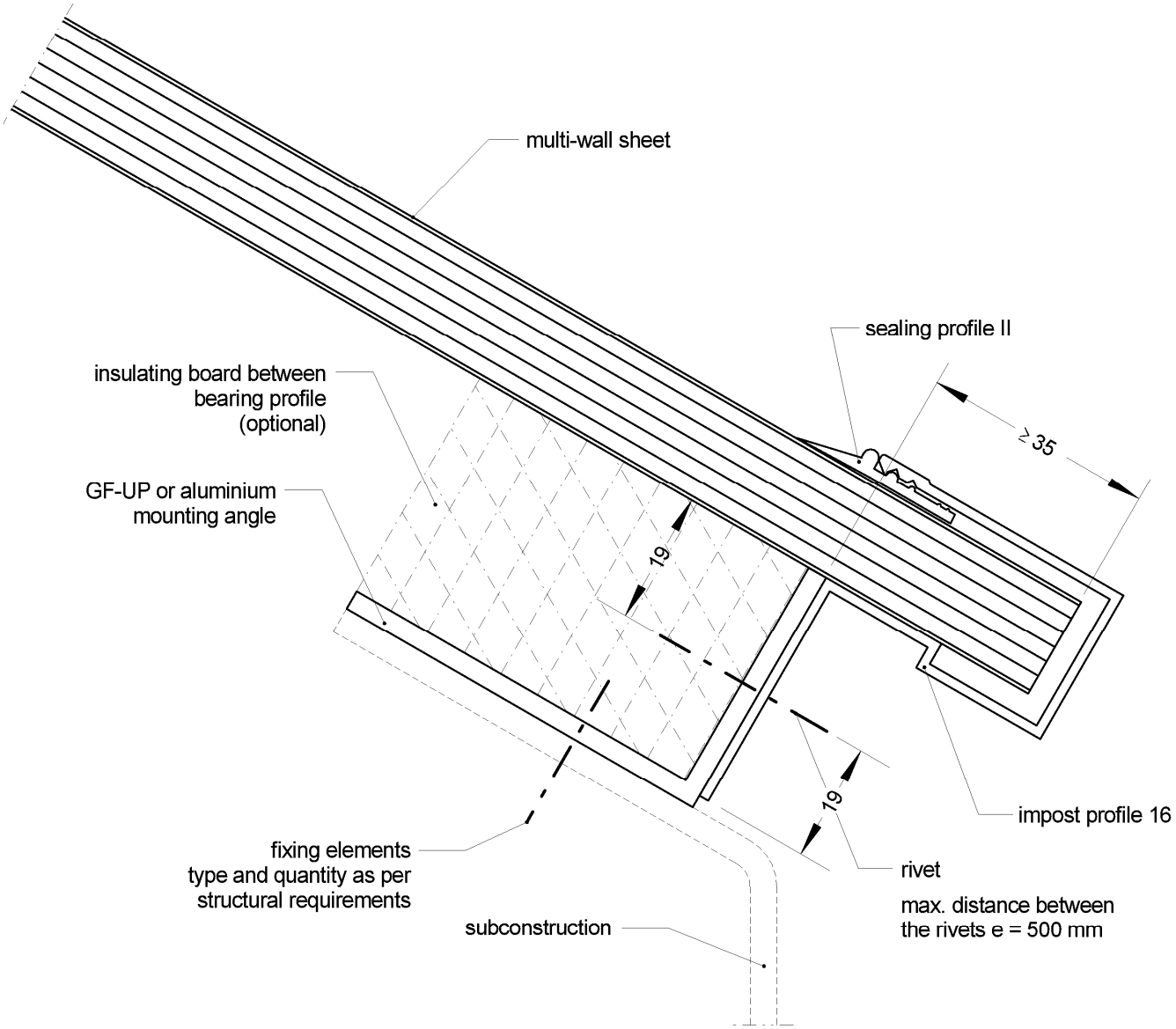

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.2.1
Combinations of impost profiles, multiple-span-systems section D-D for the type: "PC 16"	

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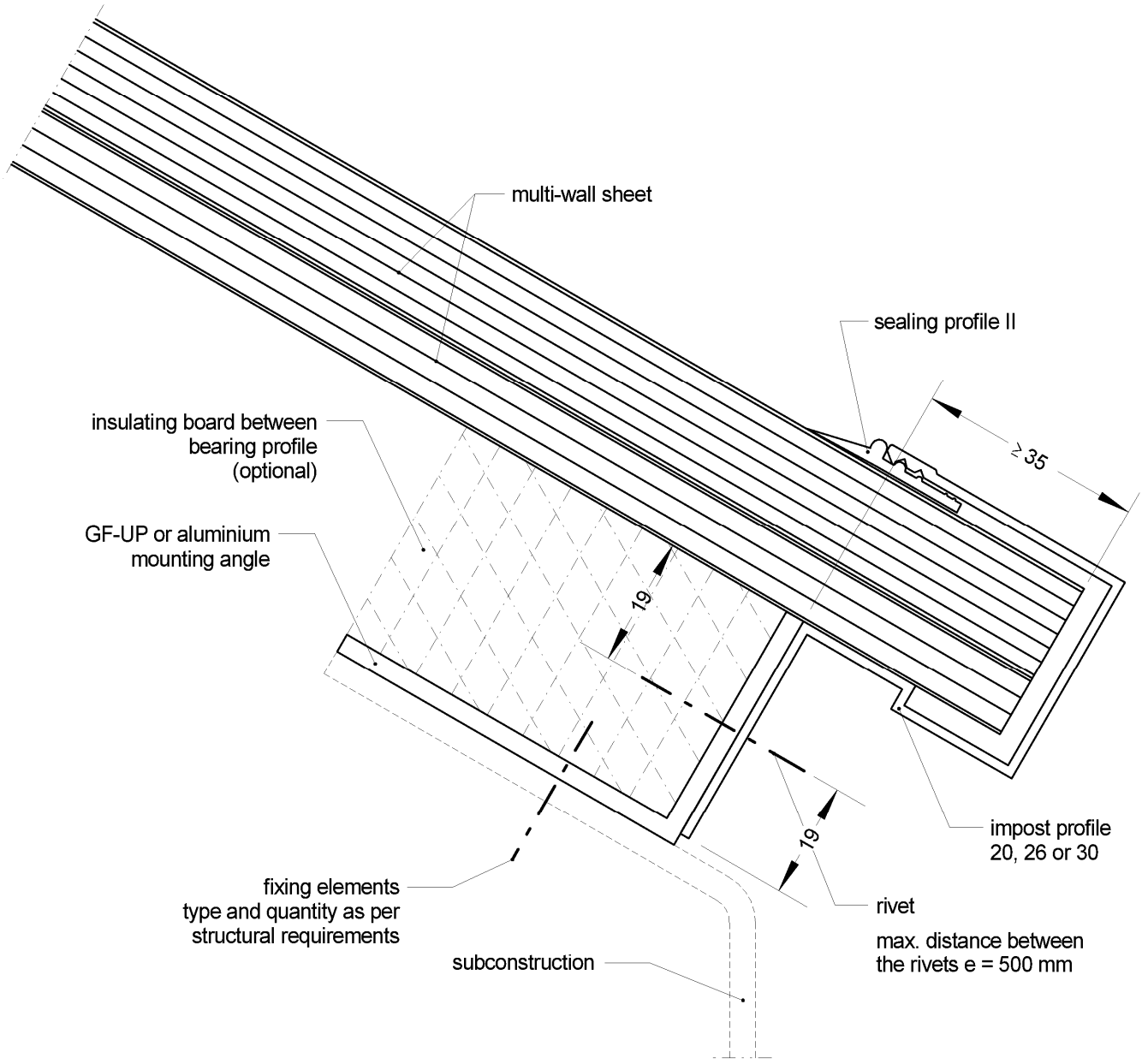

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.2.2
Combinations of impost profiles, multiple-span-systems section D-D for the type: "PC 10+10, PC 16+10 and PC 20+10"	

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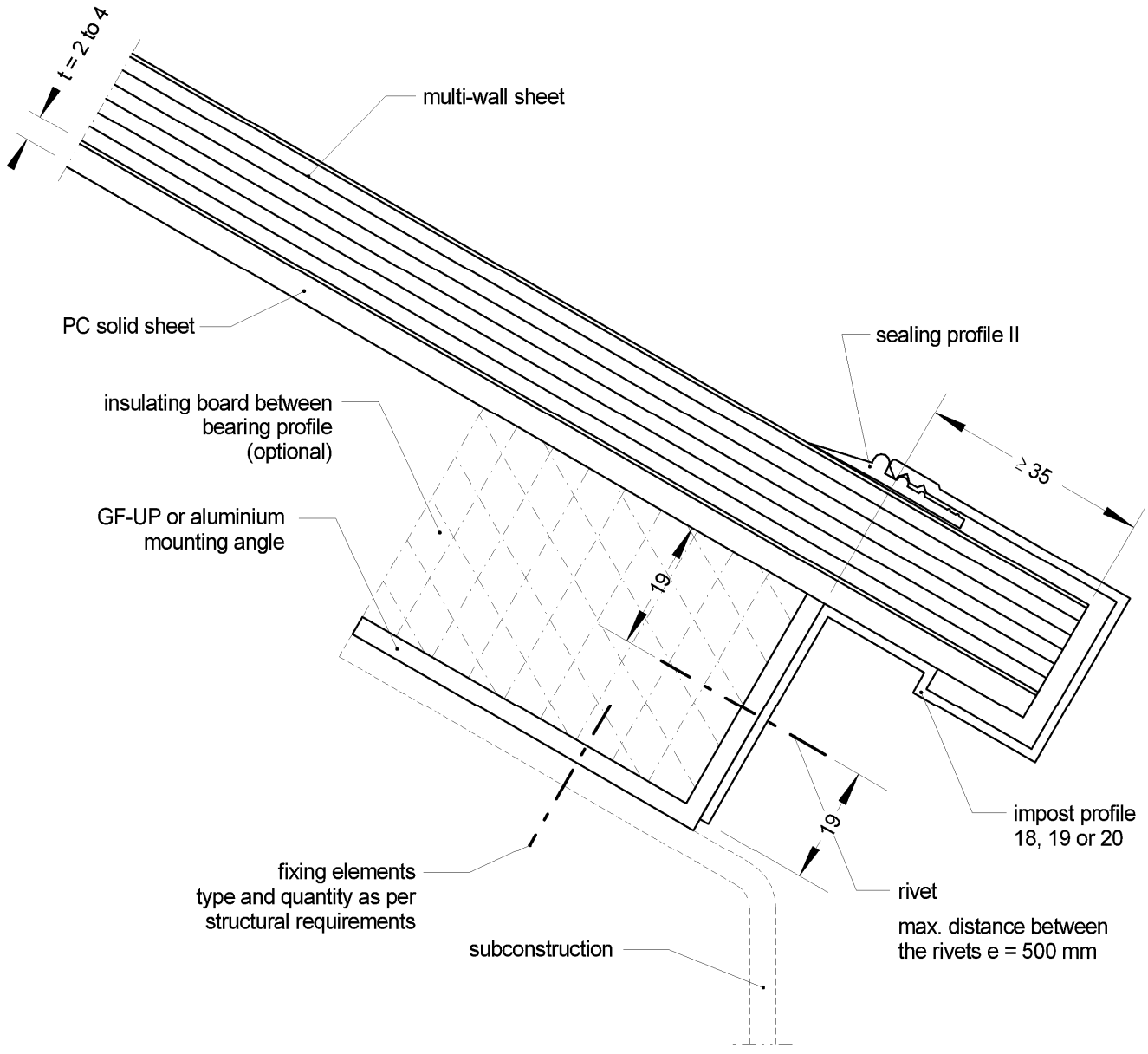
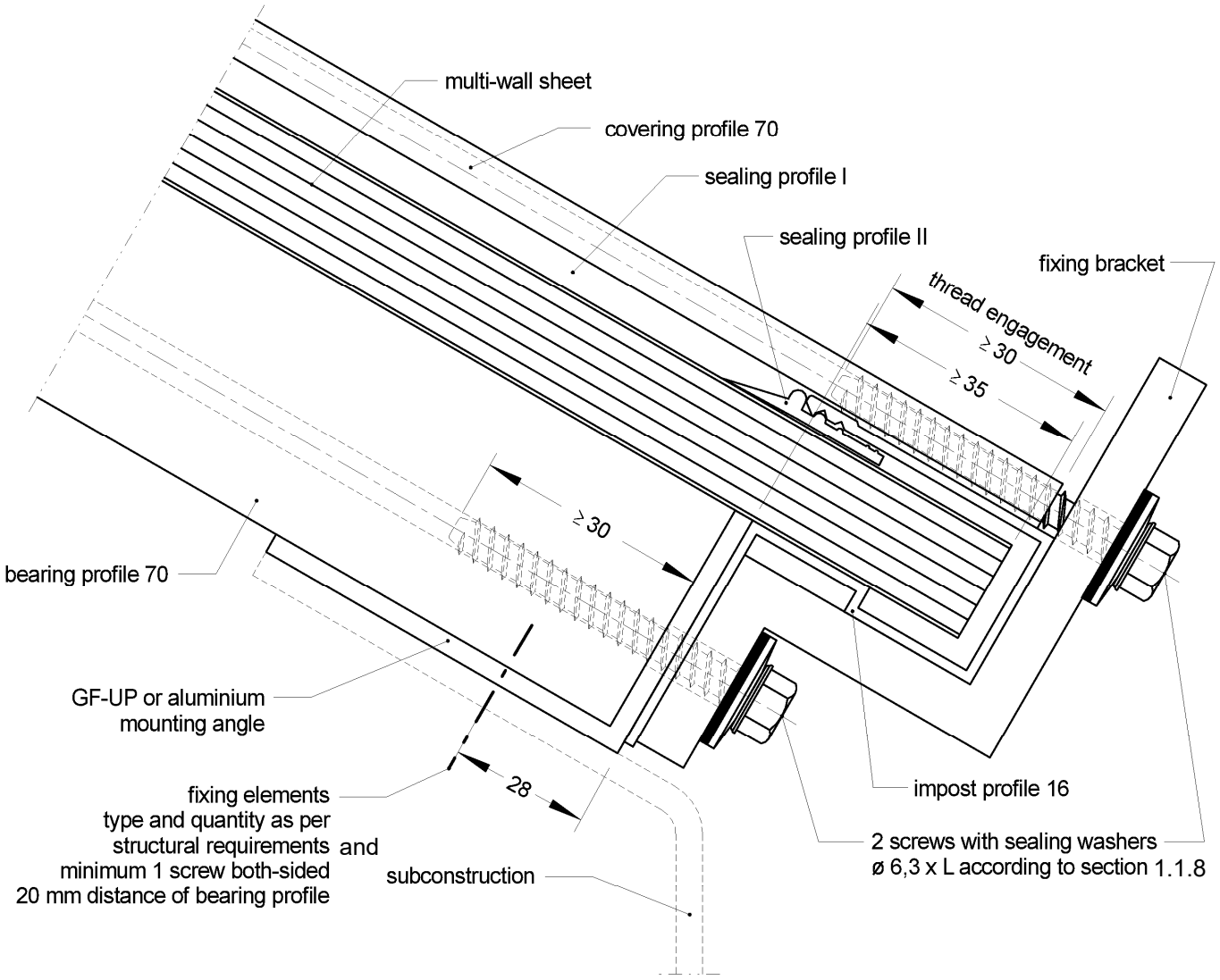


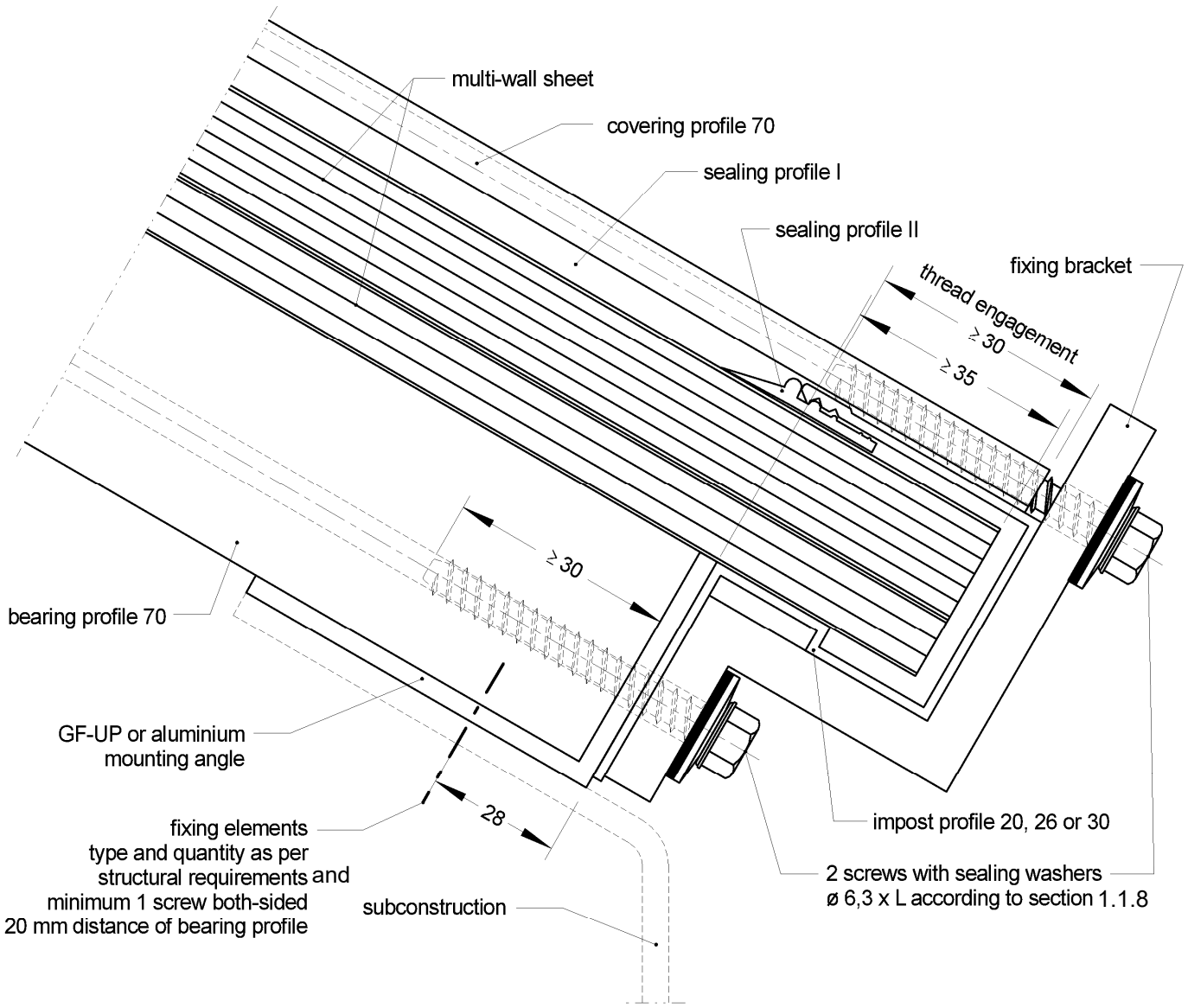
All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.2.3
Combinations of impost profiles, multiple-span-systems section D-D for the type: "PC 16+2, PC 16+3 und PC 16+4"	



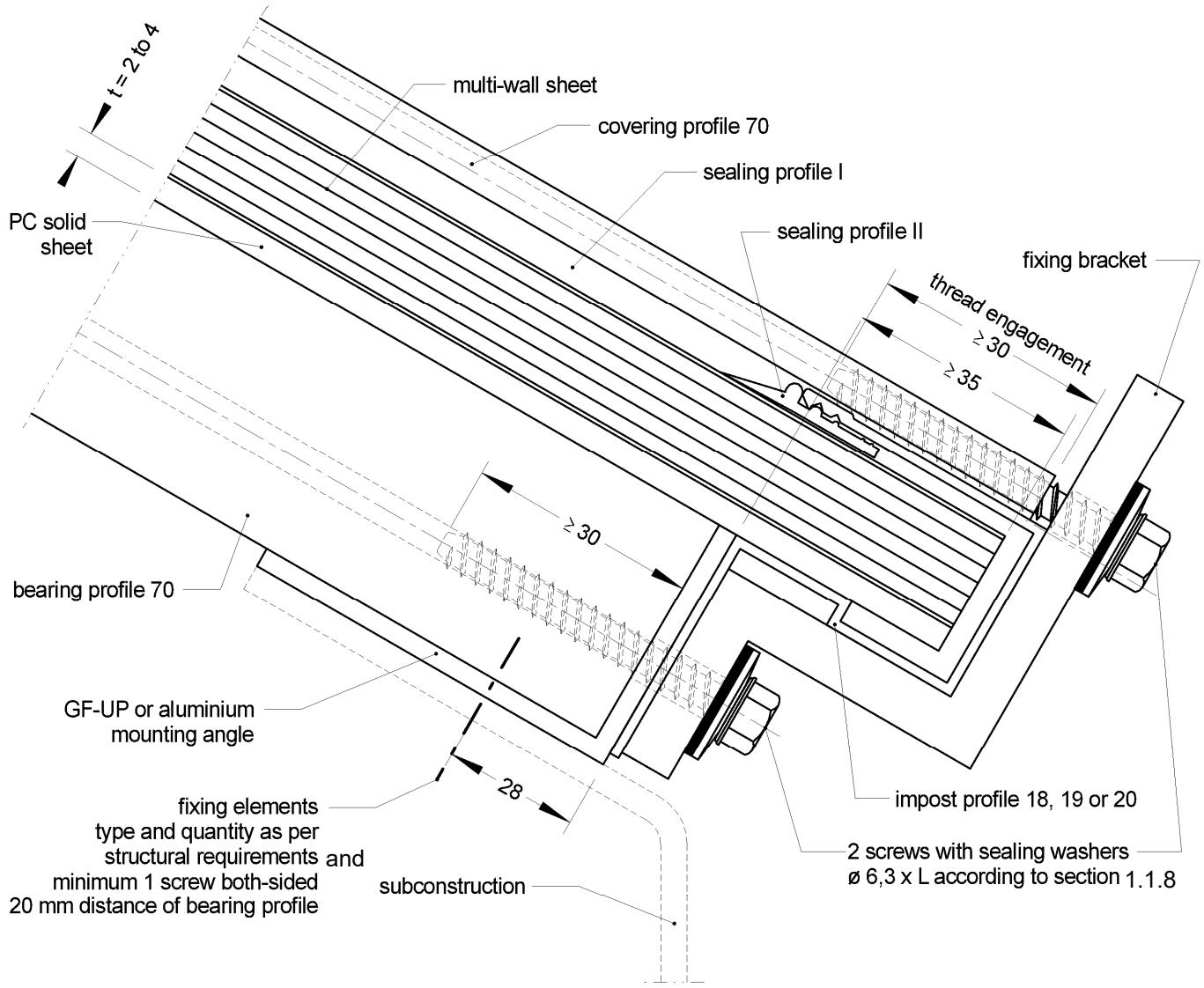
All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.3.1
Combinations of impost profiles, multiple-span-systems section E-E for the type: "PC 16"	



All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.3.2
Combinations of impost profiles, multiple-span-systems section E-E for the type: "PC 10+10, PC 16+10 and PC 20+10"	



All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.3.3
Combinations of impost profiles, multiple-span-systems section E-E for the type: "PC 16+2, PC 16+3 und PC 16+4"	

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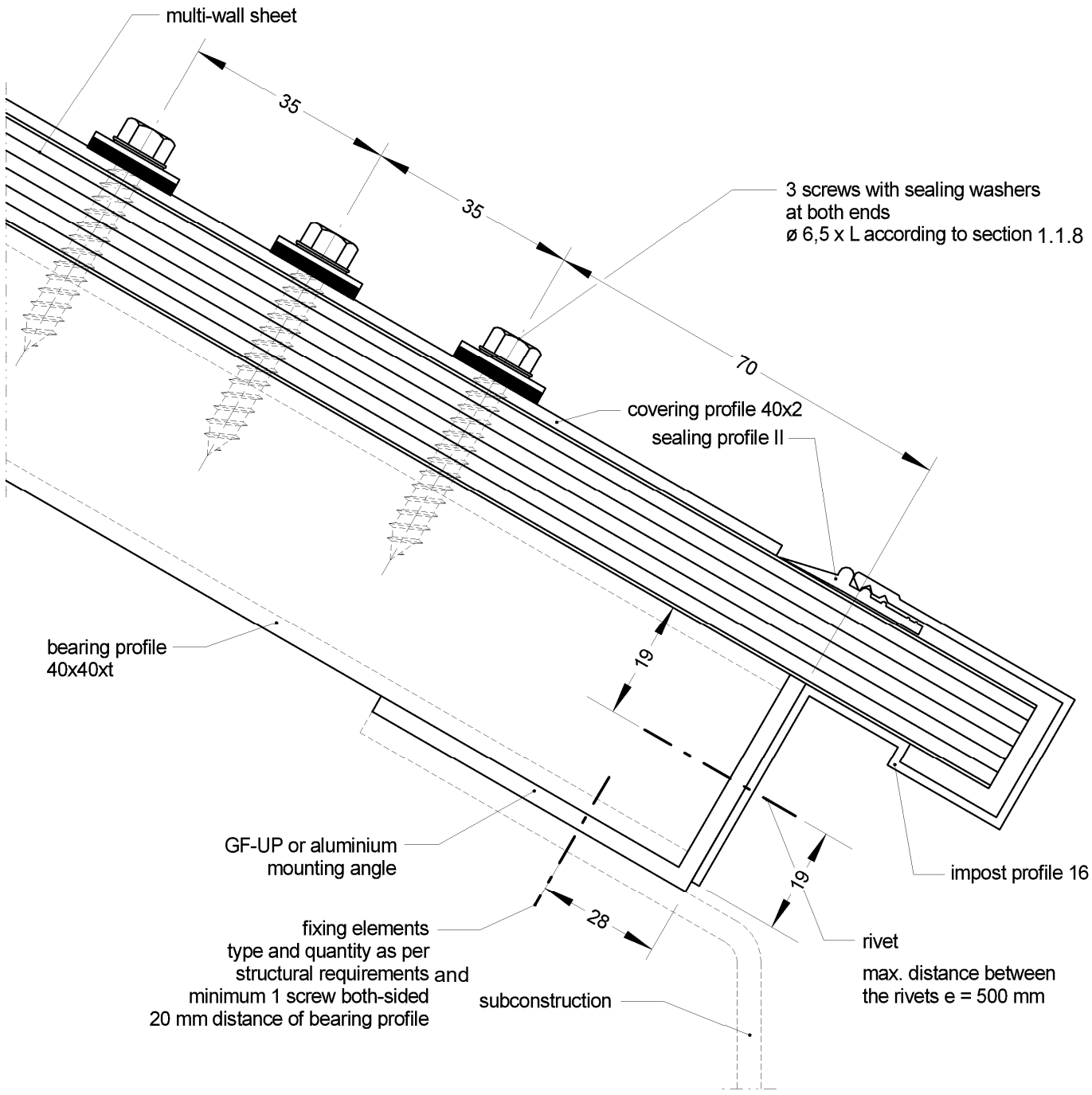

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.4.1
Combinations of impost profiles, multiple-span-systems section F-F for the type: "PC 16"	

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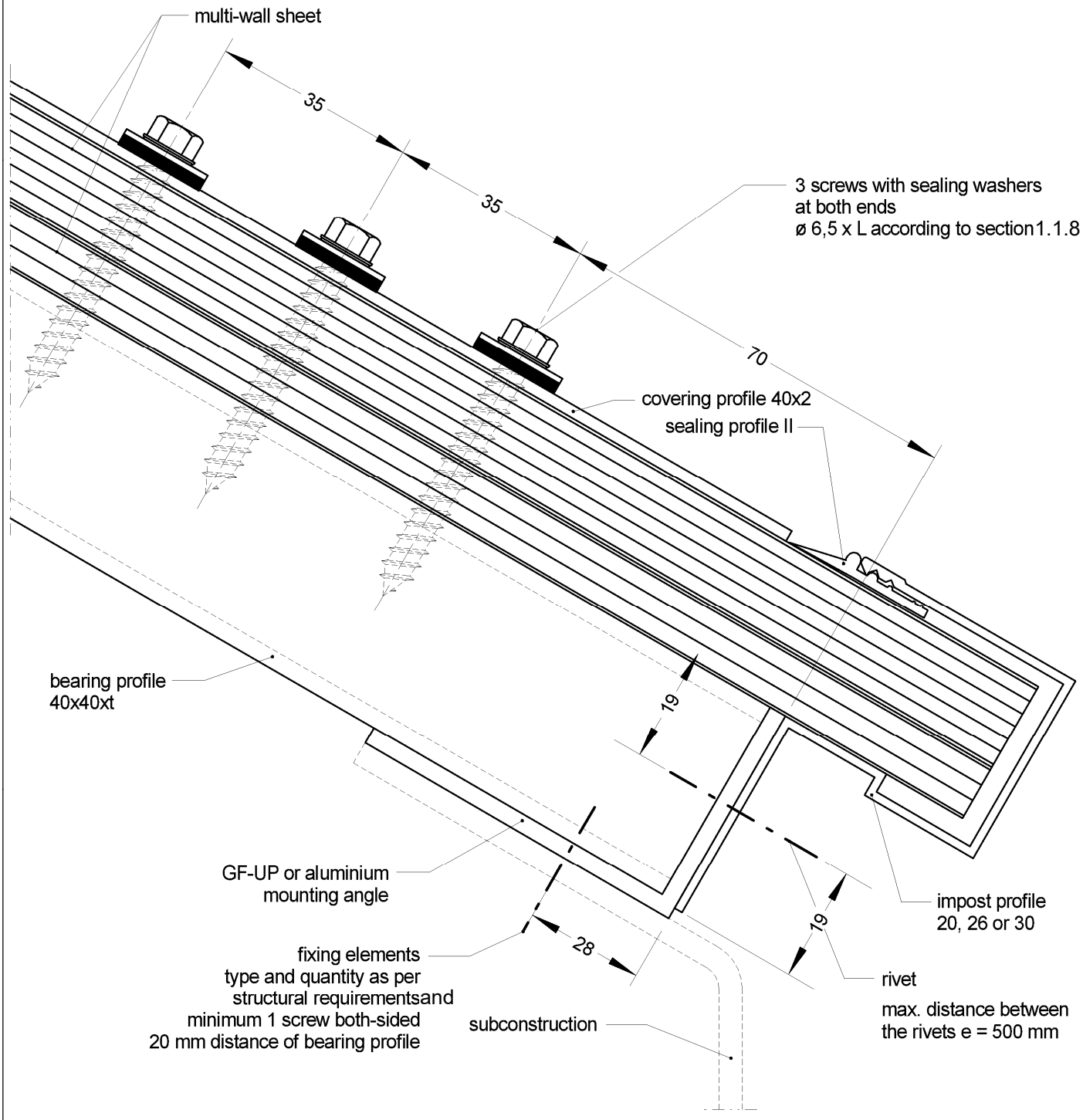

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.4.2
Combinations of impost profiles, multiple-span-systems section F-F for the type: "PC 16+10, PC 16+10 and PC 20+10"	

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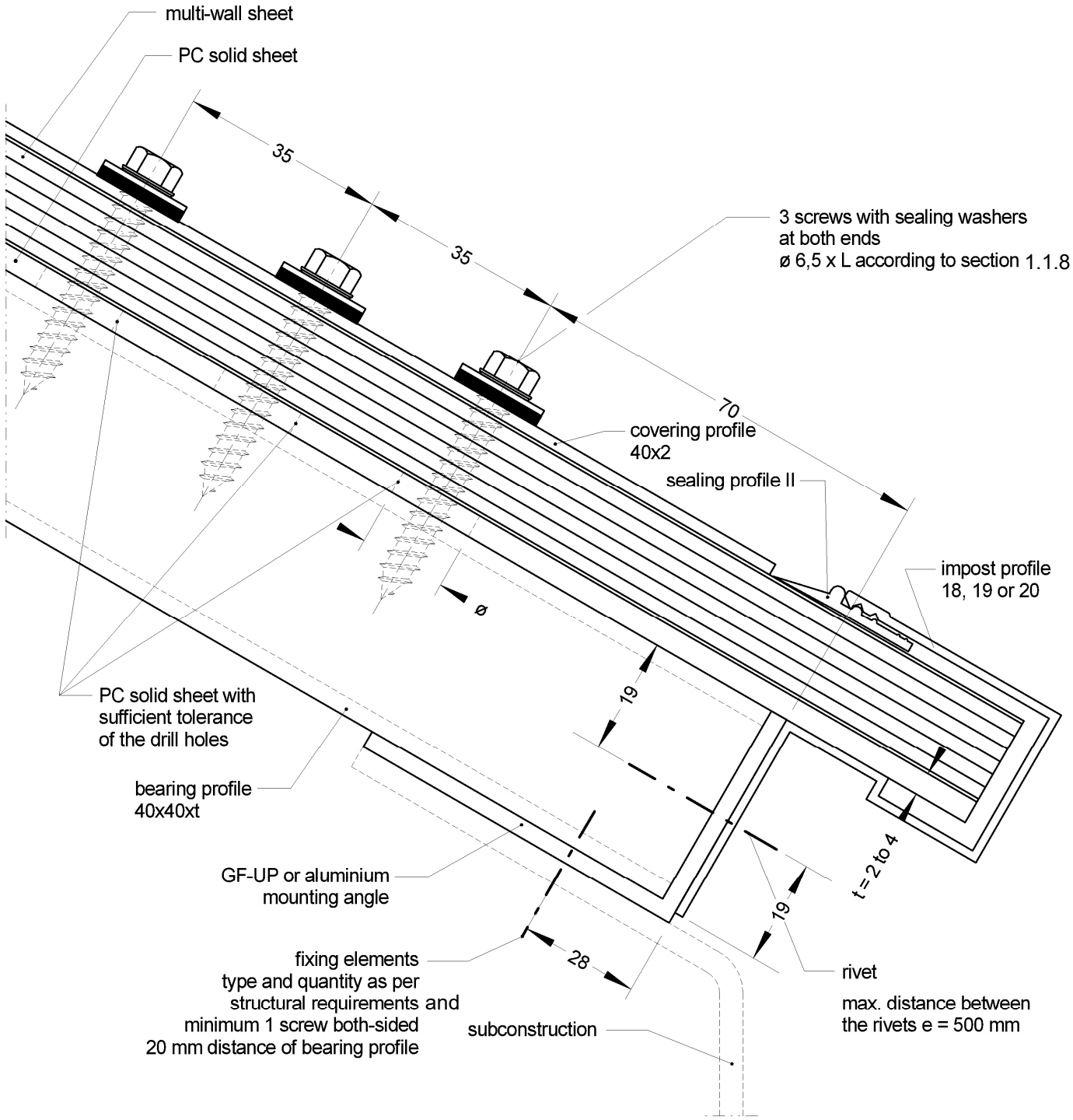

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 2.4.3
Combinations of impost profiles, multiple-span-systems section F-F for the type: "PC 16+2, PC 16+3 und PC 16+4"	

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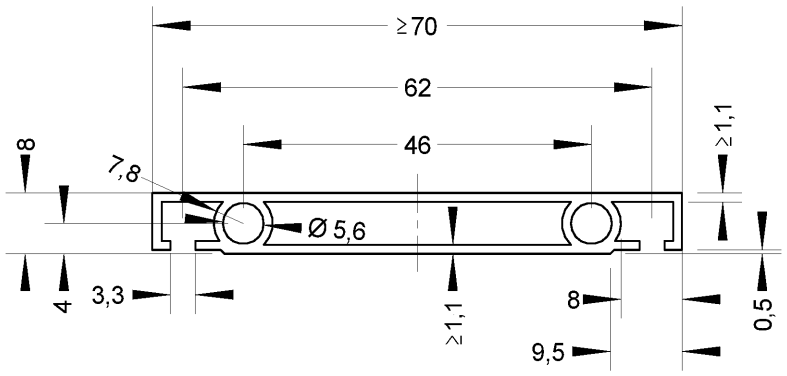
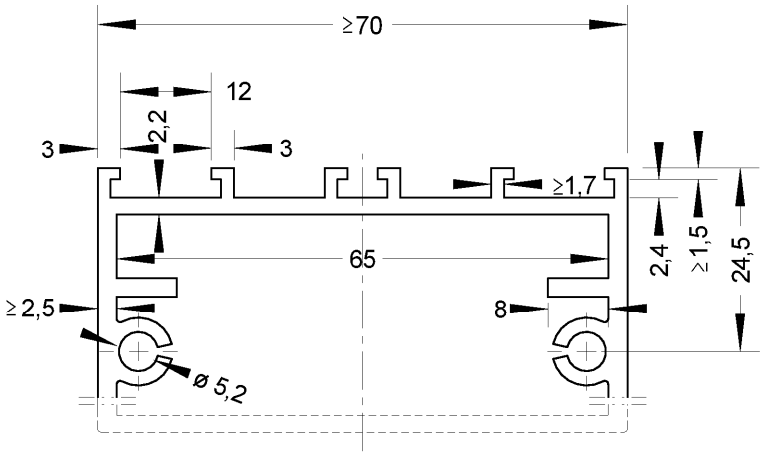
covering profile 70



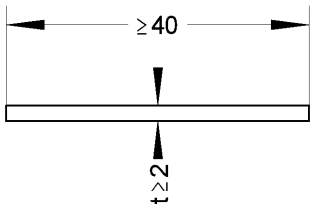
EN AW-6060
condition T66

bearing profile 70



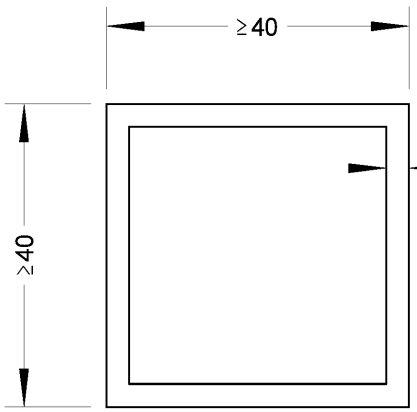
EN AW-6060
condition T66

covering profile 40xt



EN AW-6060
condition T66

bearing profile 40x40xt



EN AW-6060
condition T66

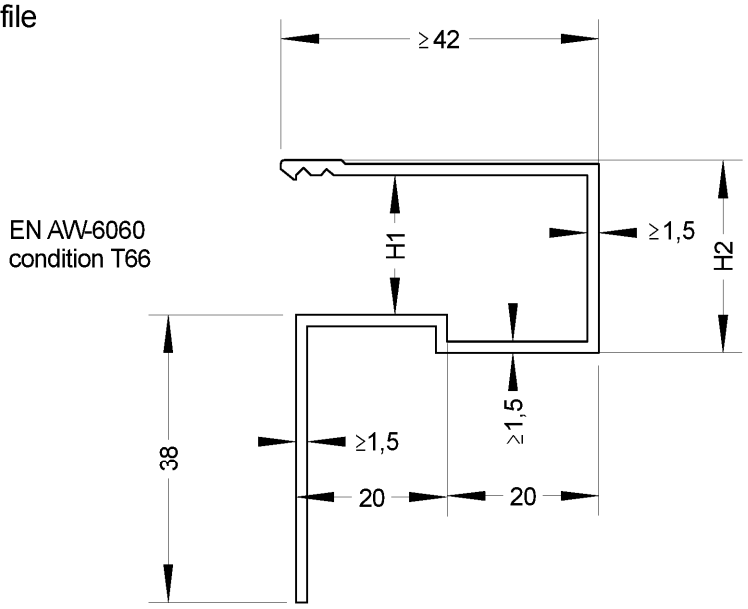
Dimensions without tolerance:
tolerances as per EN 755-9

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 3.1
Covering profiles and bearing profiles	

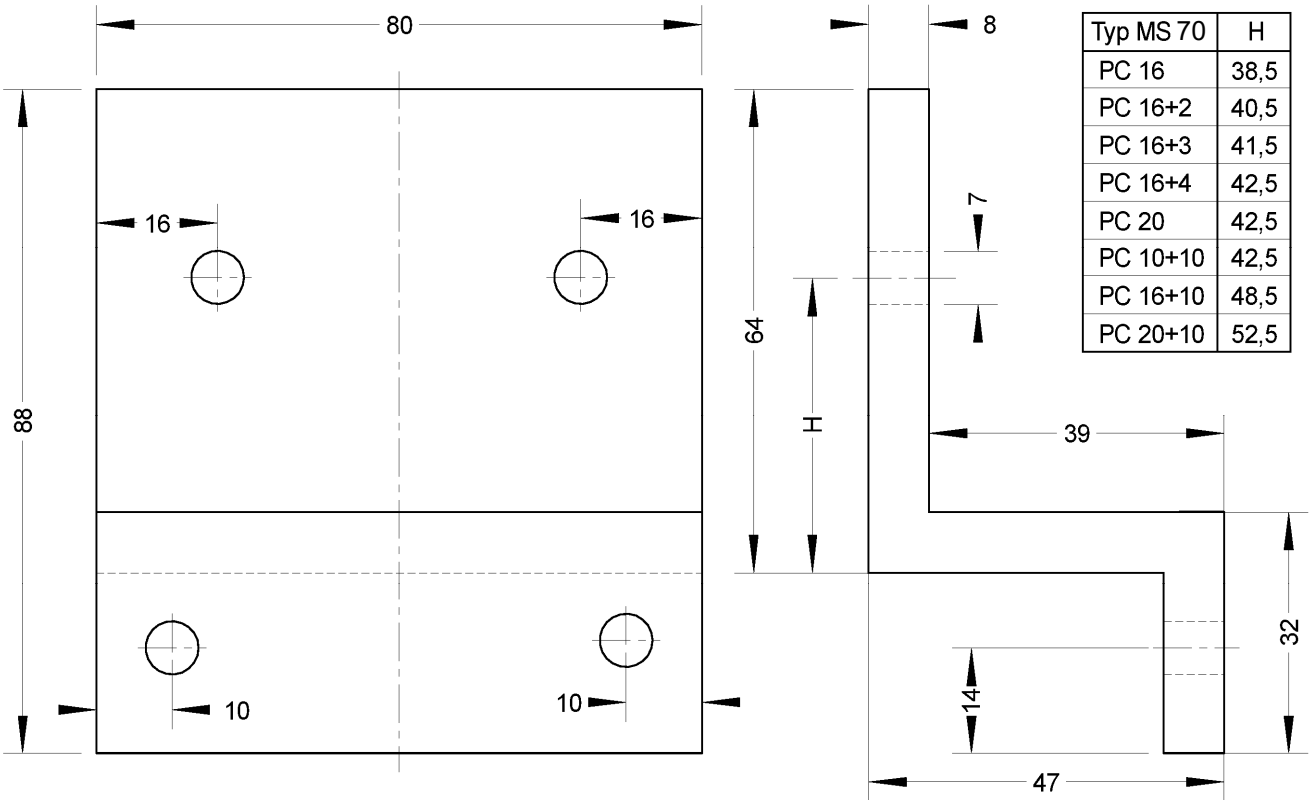
Deutsches Institut für Bautechnik DIBt

impost profile



Typ MS 70	H1	H2
PC 16	18,5	25,5
PC 16+2	20,5	27,5
PC 16+3	21,5	28,5
PC 16+4	22,5	29,5
PC 20	22,5	29,5
PC 10+10	22,5	29,5
PC 16+10	28,5	35,5
PC 20+10	32,5	39,5

fixing bracket



Typ MS 70	H
PC 16	38,5
PC 16+2	40,5
PC 16+3	41,5
PC 16+4	42,5
PC 20	42,5
PC 10+10	42,5
PC 16+10	48,5
PC 20+10	52,5

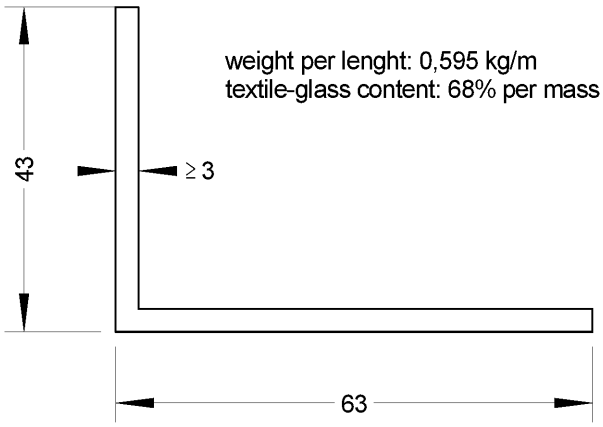
Dimensions without tolerance:
tolerances as per EN 755-9

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 3.2
Impost profile and fixing bracket	

Deutsches Institut für Bautechnik DIBt

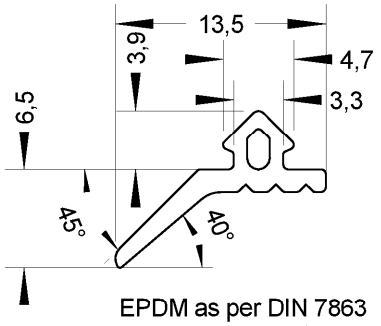
GF-UP mounting angle 63x43x3



weight per lenght: 0,595 kg/m
textile-glass content: 68% per mass

optional:
aluminium mounting angle
60x40x3
EN AW-6060
condition T66

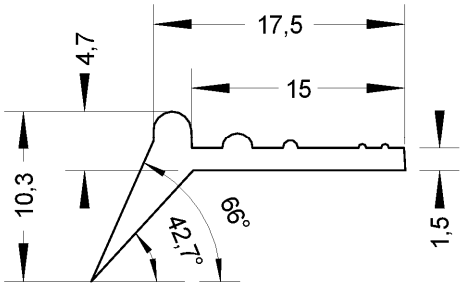
sealing profile I



scale 2:1

EPDM as per DIN 7863
hardness (60±5) Shore A
as per DIN ISO 7619-1

sealing profile II



scale 2:1

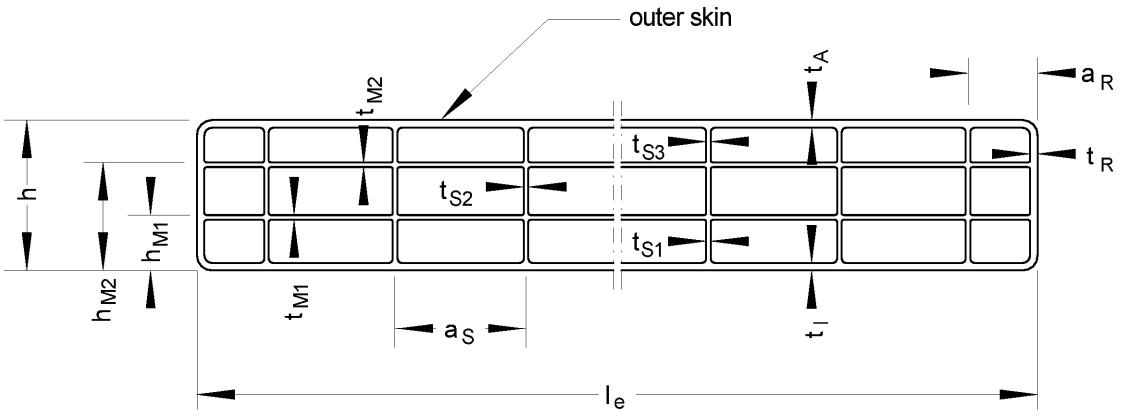
EPDM as per DIN 7863
hardness (70±5) Shore A
as per DIN ISO 7619-1

All dimensions in mm

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 3.3
GF-UP mounting angle and sealing profiles	

Deutsches Institut für Bautechnik DIBt

Sheet: **Akyver Sun Type 10/4w-7 1750**
Manufacturer: **CORPLEX, Kaysersberg, France**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	a_S mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_{S3} mm
2100	10,2	3,9	6,8	6,9	4,1	0,49	0,45	0,26	0,19	0,20
+ 6 - 2	+ 0,5 - 0,5	+ 0,3 - 0,5	+ 0,35 - 0,5	+ 0,3	+ 2,1	- 0,09	- 0,10	- 0,03	- 0,03	- 0,04

t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,05	0,40	1,73	
- 0,03	- 0,31	+0,10 - 0,10	≤ 13°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
50,2 Nm²/m	19,2 Nm²/m	1640 N/m	42,0 Nm/m	42,6 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

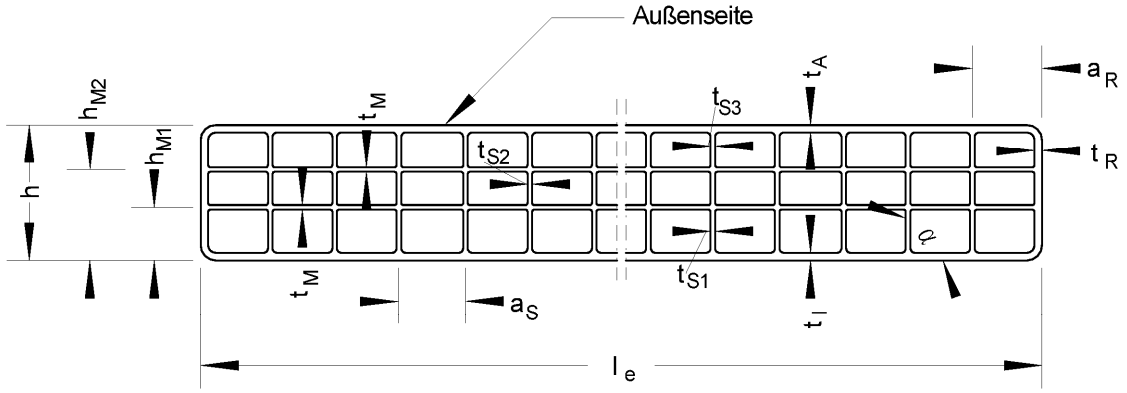
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.1
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Akyver Sun Type 10/4w-7"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Makrolon multi UV 4/10-6**
Manufacturer: **Exolon Group S.p.A., Nera Montoro**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	a_S mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_{S3} mm
2100	10,0	3,4	6,8	6,0	3,2	0,44	0,44	0,23	0,16	0,20
+ 6 - 2	+ 0,5 - 0,5	+ 0,4 - 0,3	+ 0,35 - 0,45	+ 0,25	+ 0,3	- 0,04	- 0,05	- 0,04	- 0,05	- 0,03

t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,08	0,26	1,73	
- 0,02	- 0,08	+0,10 - 0,02	≤8°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
49,0 Nm²/m	23,1 Nm²/m	2152 N/m	47,4 Nm/m	39,6 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

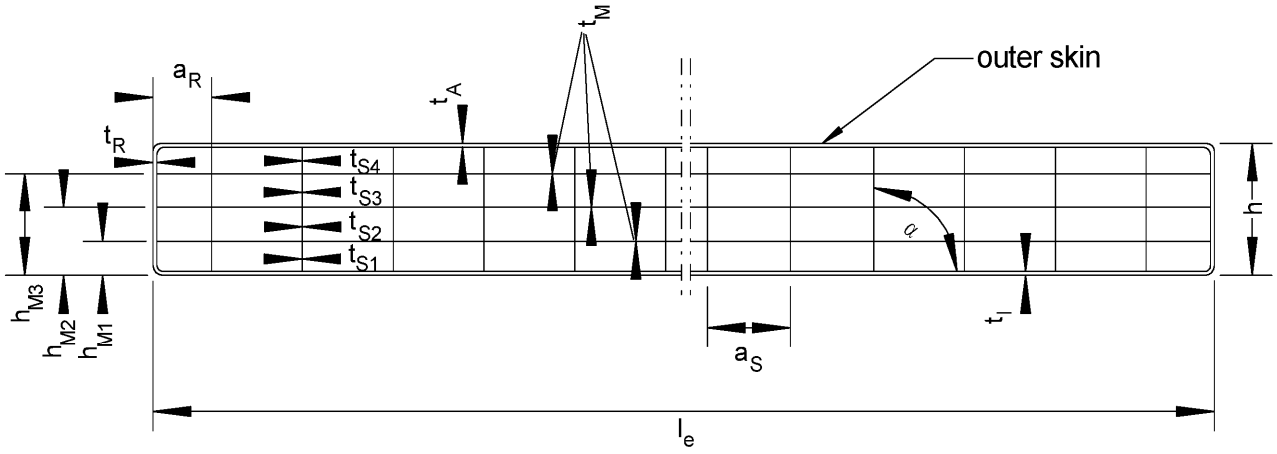
Dachlichtband Alphaglas gewölbt Typ MS 70

Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Makrolon multi UV 4/10-6"

Annex A 4.2

Deutsches Institut für Bautechnik DIBt

Sheet: **Policarb 10 mm 5W**
Manufacturerr: **dott.gallina s.r.l.**
Resin: **ISO 7391-PC,EL,61-03-9**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	a_S mm	a_R mm	t_A mm	t_I mm
2100	9,8	2,8	4,9	7,2	7,9	4,9	0,45	0,40
+ 6 - 2	+ 0,5 - 0,5	+ 0,2 - 0,1	+ 0,3 - 0,1	+ 0,5 - 0,1	+ 0,3	+ 1,0	- 0,04	- 0,04

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,44	0,40	0,36	0,41	0,07	0,31	1,83	
- 0,06	- 0,04	- 0,08	- 0,06	- 0,01	- 0,11	- 0,12	≤8°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
53,2 Nm²/m	22,9 Nm²/m	2448 N/m	57,5 Nm/m	43,8 Nm/m

$M_{b,pos}$: outer skin under pressure

$M_{b,neg}$: inner skin under pressure

Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (Δ A)	5 % (Δ A)	Cu 1	Ku 1

Reaction to fire: Class B-s1.d0 in accordance with EN13501-1

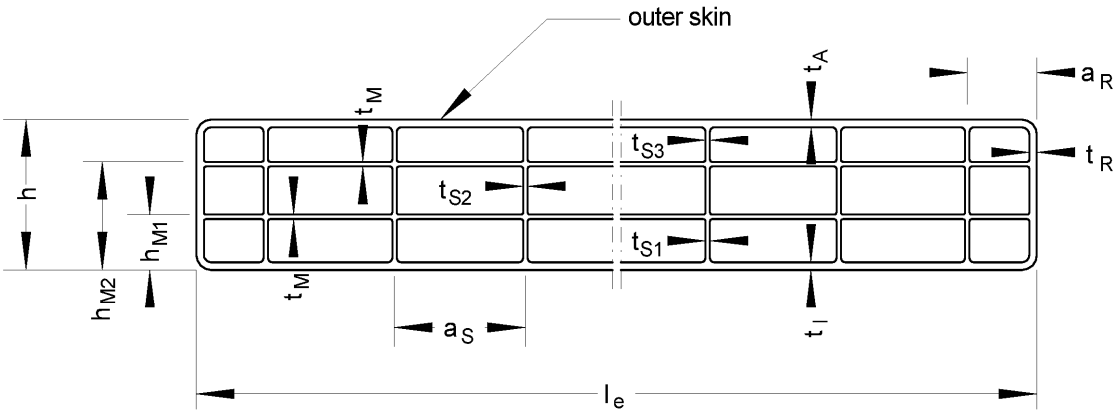
Dachlichtband Alphaglas gewölbt Typ MS 70

Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015
"Policarb 10 mm 5W"

Annex A 4.3

Deutsches Institut für Bautechnik DIBt

Sheet: **Policarb 10 mm 4W**
Manufacturer: **dott.gallina s.r.l.**
Resin: **ISO 7391-PC,EL,61-03-9**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	a_S mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_{S3} mm
2100	10,0	3,0	7,1	7,9	3,7	0,44	0,40	0,37	0,32	0,35
+6 -2	± 0,5	+ 0,35 - 0,15	+ 0,2 - 0,3	+ 0,25	+ 2,05	- 0,06	- 0,04	- 0,06	- 0,05	- 0,06

t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,07	0,30	1,76	≤ 6°
- 0,02	- 0,22	+ 0,11 - 0,07	

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
44,4 Nm²/m	19,0 Nm²/m	3135 N/m	46,7 Nm/m	35,7 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

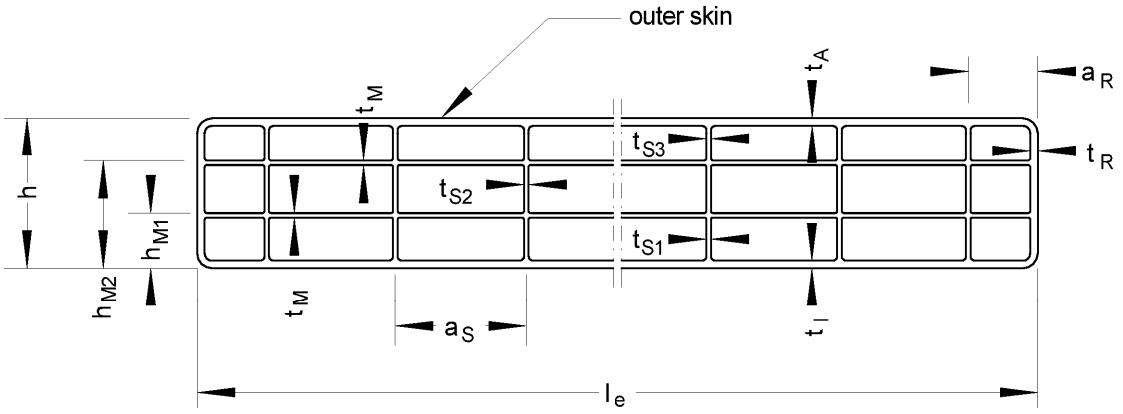
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.4
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Policarb 10 mm 4W"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Macrolux Multiwall LL 4W - 10 mm**
Manufacturer: **Stabilit Suisse S.A.**
Resin: **ISO 7391-PC,EL,61-03-9**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	a_S mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_{S3} mm
2100	9,9	2,9	7,8	9,1	7,5	0,41	0,49	0,33	0,25	0,36
+ 6 - 2	± 0,5	+ 0,15 - 0,3	+ 0,3 - 0,3	+ 0,6	+ 1,7	- 0,08	- 0,12	- 0,04	- 0,07	- 0,07

t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,04	0,56	1,69	
- 0,01	- 0,20	+ 0,16 - 0,10	≤ 8°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
49,7 Nm²/m	17,3 Nm²/m	2129 N/m	41,2 Nm/m	44,0 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

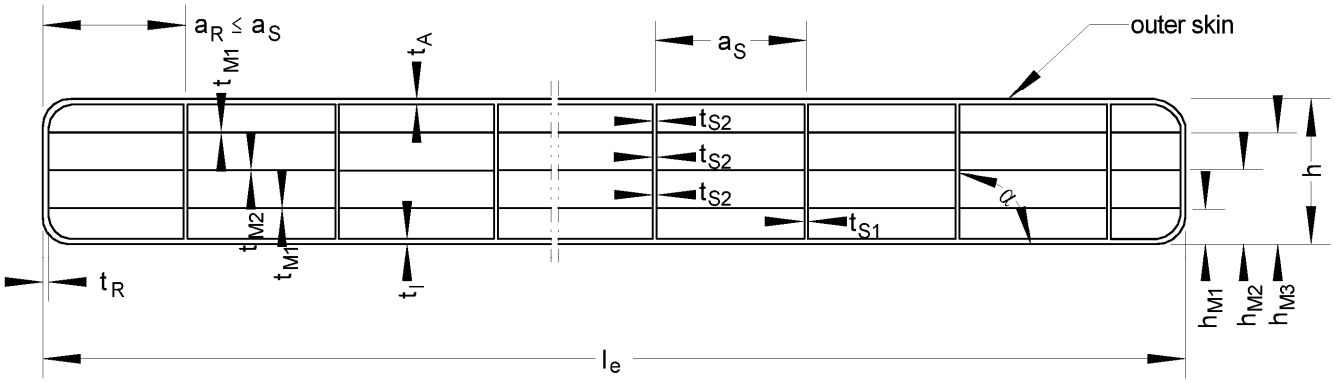
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.5
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Macrolux Multiwall LL 4W - 10 mm"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Lexan Thermoclear Sheet LT2UV105R175**
Manufacturer: **SABIC Innovative Plastics B.V.**
Resin: **ISO 7391-PC,EL,61-05-9**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	a_S mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_R mm
2100	10,0	3,10	5,30	7,70	7,70	0,46	0,42	0,30	0,24	0,44
+ 6 - 2	± 0,5	+ 0,25 - 0,4	+ 0,4 - 0,4	+ 0,35 - 0,5	+ 0,35	- 0,06	- 0,06	- 0,02	- 0,04	- 0,14

t_{M1} mm	t_{M2} mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,06	0,06	1,80	
- 0,02	- 0,02	+ 0,09 - 0,08	≤ 3°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
48,8 Nm²/m	21,9 Nm²/m	2713 N/m	55,0 Nm/m	41,9 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

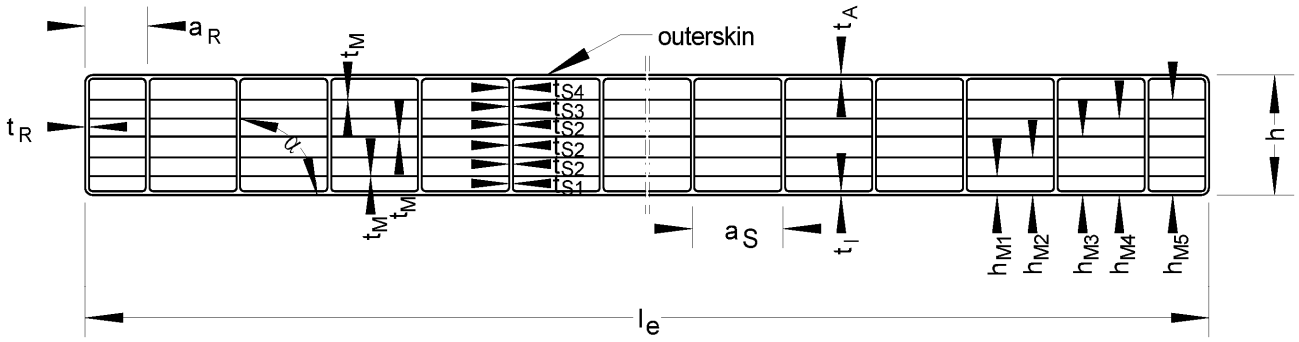
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.6
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Lexan Thermoclear Sheet LT2UV105R175"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Akyver Sun Type 16/7w12 2700**
Manufacturer: **CORPLEX, Kaysersberg, France**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	t_A mm	t_I mm
2100	16,1	2,9	5,4	8,1	10,6	13,0	12,0	7,6	0,61	0,61
+6 -2	± 0,5	+ 0,5 - 0,3	+ 0,4 - 0,5	+ 0,4 - 0,4	+ 0,2 - 0,4	+ 0,2 - 0,2	+ 0,2	+ 1,5	- 0,10	- 0,08

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,32	0,41	0,50	0,46	0,07	0,72	2,69	
- 0,06	- 0,07	- 0,07	- 0,09	- 0,02	- 0,23	+ 0,13 - 0,13	≤ 5°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
195,0 Nm²/m	64,1 Nm²/m	2402 N/m	73,3 Nm/m	65,1 Nm/m

$M_{b,pos}$: outer skin under pressure

$M_{b,neg}$: inner skin under pressure

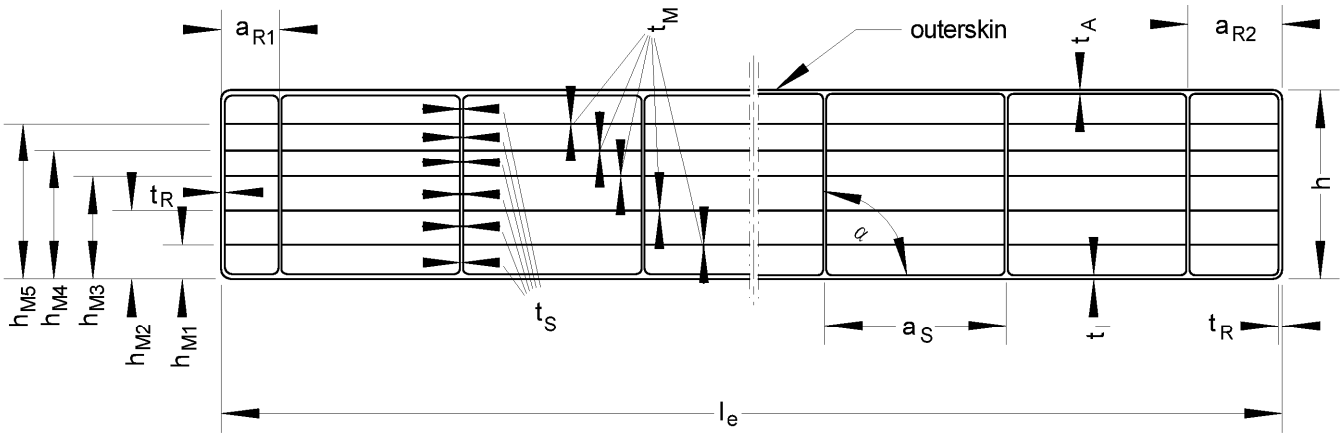
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.7
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Akyver Sun Type 16/7w-12 2700"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Makrolon multi UV 7/16-14**
Manufacturer: **Exolon Group S.p.A., Nera Montoro**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_{R1} mm	a_{R2} mm	weight per area kg/m²
2100	16,0	3,2	5,7	8,2	10,7	13,2	13,9	7,4	9,6	2,63
+6 -2	± 0,5	+ 0,5 - 0,4	+ 0,5 - 0,6	+ 0,6 - 0,6	+ 0,6 - 0,5	+ 0,5 - 0,3	+ 0,2	+ 1,7	+ 1,5	+ 0,13 - 0,05

t_A mm	t_I mm	t_S mm	t_M mm	t_R mm	difference $\lvert\Delta\alpha\rvert$ to 90°
0,59	0,61	0,39	0,08	0,67	
- 0,07	- 0,10	- 0,14	- 0,02	- 0,30	≤ 8°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
176,9 Nm²/m	45,7 Nm²/m	2254 N/m	64,6 Nm/m	62,9 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

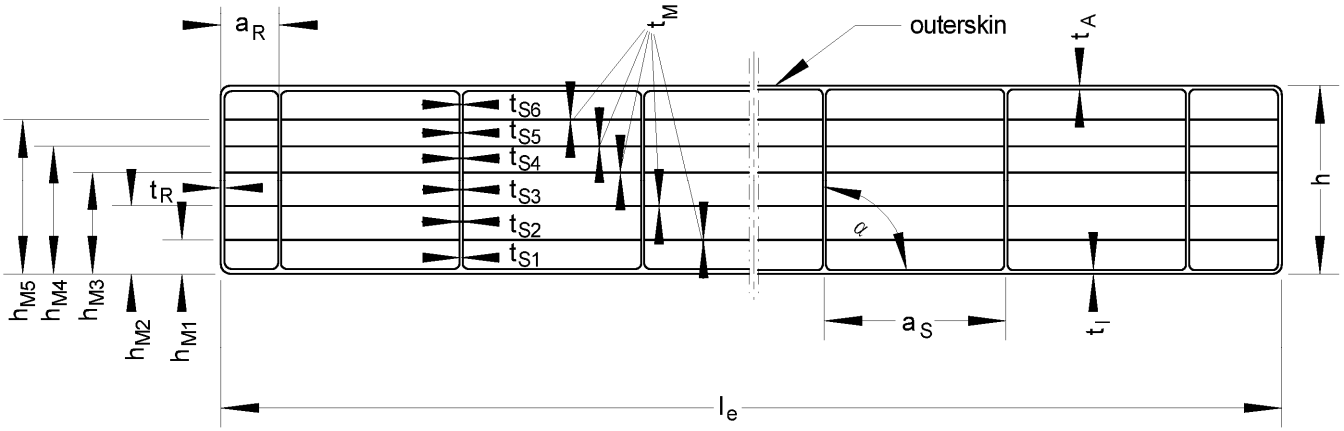
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.8
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Makrolon multi UV 7/16-14"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Policarb 16 mm 7W**
Manufacturer: **dott.gallina s.r.l.**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	weight per area kg/m²
2100	15,9	2,7	5,5	8,0	10,7	13,4	13,8	10,8	2,64
+6 -2	+ 0,6 - 0,4	+ 0,4 - 0,5	+ 0,6 - 0,3	+ 0,2 - 0,4	+ 0,3 - 0,2	+ 0,2 - 0,3	+ 0,2	+ 1,1	+ 0,09 - 0,17

t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_{S5} mm	t_{S6} mm	t_M mm	t_R mm	difference $\lvert\Delta\alpha\rvert$ to 90°
0,63	0,61	0,39	0,41	0,34	0,29	0,30	0,36	0,09	0,46	
- 0,04	- 0,03	- 0,06	- 0,05	- 0,03	- 0,04	- 0,03	- 0,05	- 0,01	- 0,11	≤ 9°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
169,9 Nm²/m	48,4 Nm²/m	2195 N/m	69,7 Nm/m	58,7 Nm/m

$M_{b,pos}$: outer skin under pressure

$M_{b,neg}$: inner skin under pressure

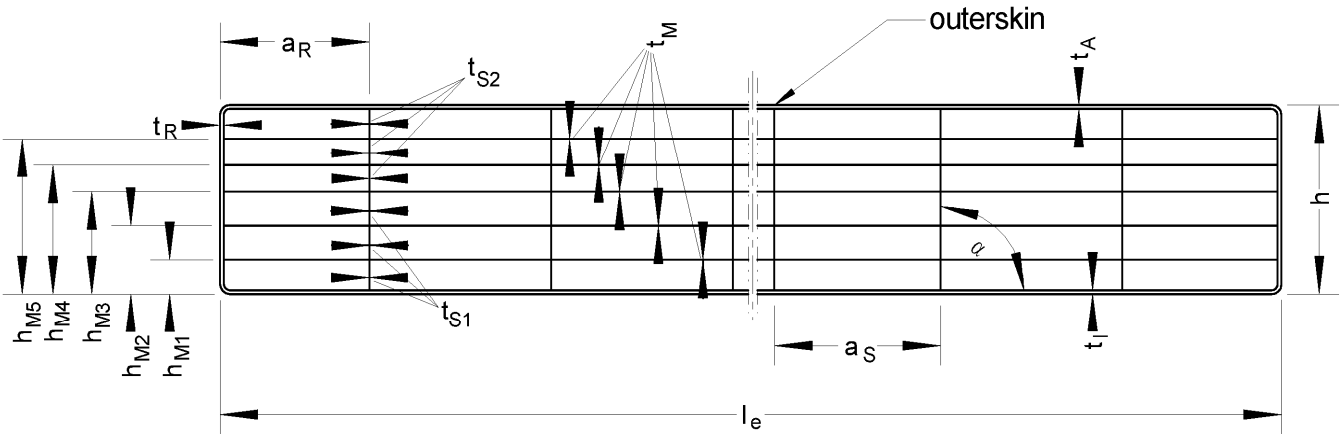
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.9
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Policarb 16 mm 7W"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Macrolux Multiwall LL 7W - 16 mm - 2,6 kg/m²**
Manufacturer: **Stabilit Suisse S.A.**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	t_A mm	t_I mm
2100	15,9	2,9	5,1	7,6	10,8	13,2	15,8	11,9	0,67	0,69
+6 -2	± 0,5	+ 0,35 - 0,3	+ 0,45 - 0,55	+ 0,65 - 0,65	+ 0,7 - 0,65	+ 0,25 - 0,4	+ 0,3	+ 2,0	- 0,16	- 0,13

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_{S5} mm	t_{S6} mm	t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,46	0,47	0,40	0,33	0,39	0,38	0,06	0,54	2,58	
- 0,08	- 0,10	- 0,07	- 0,06	- 0,06	- 0,05	- 0,02	- 0,21	- 0,13	≤ 9°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
170,3 Nm²/m	36,0 Nm²/m	2404 N/m	70,8 Nm/m	63,1 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

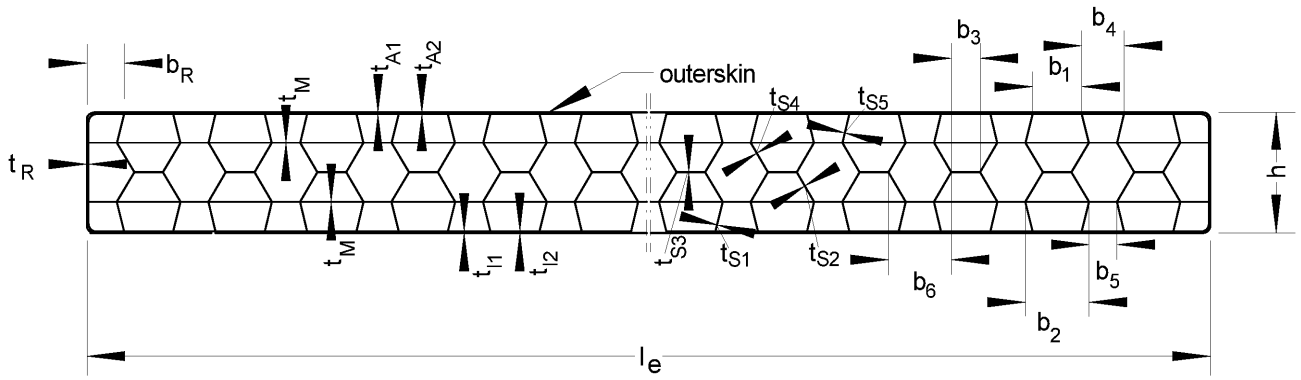
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.10
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Macrolux Multiwall LL 7W - 16 mm - 2,6 kg/m²"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Macrolux Multiwall HC - 16mm**
Manufacturer: **Stabilit Suisse S.A.**
Resin: **ISO 21305-PC,X,EGL,05-09**



l_e mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	b_R mm	t_R mm	t_{A1} mm	t_{A2} mm	t_{I1} mm	t_{I2} mm	t_M mm
2100	3,8	7,6	12,3	4,0	6,0	0,55	0,56	0,50	0,58	0,52	0,06
+6 -2	+ 0,4 - 0,2	+ 0,4 - 0,2	+ 0,5 - 0,5	+ 0,3 - 0,6	+ 1,1	- 0,36	- 0,14	- 0,13	- 0,12	- 0,11	- 0,02

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_{S5} mm	b_1 mm	b_2 mm	b_3 mm	b_4 mm	b_5 mm	b_6 mm	weight per area kg/m²
0,25	0,16	0,21	0,13	0,22	6,5	8,4	3,8	5,6	3,8	8,3	2,51
- 0,06	- 0,02	- 0,03	- 0,02	- 0,02	+ 0,5 - 0,3	+ 0,6 - 0,4	+ 0,4 - 0,2	+ 0,5 - 0,4	+ 0,4 - 1,0	+ 0,4 - 0,4	+ 0,13 - 0,13

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
178,3 Nm²/m	103,4 Nm²/m	3261 N/m	59,7 Nm/m	68,3 Nm/m

$M_{b,pos}$: outer skin under pressure

$M_{b,neg}$: inner skin under pressure

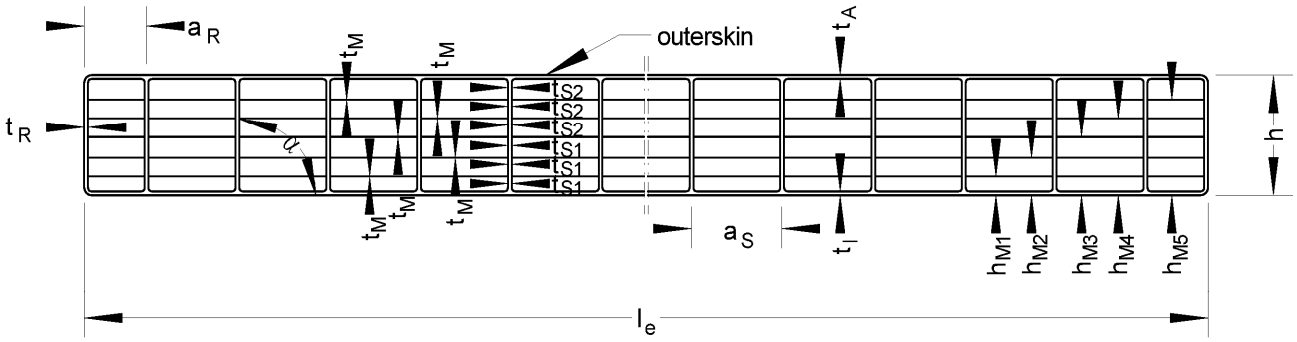
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.11
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Macrolux Multiwall HC - 16mm"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Akyver Sun Type 20/7w-12**
Manufacturer: **CORPLEX, Kaysersberg, France**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	t_A mm	t_I mm
2100	20,0	3,9	7,0	9,9	12,4	16,3	12,3	8,9	0,65	0,63
+ 6 - 2	± 0,5	+ 0,15 - 0,15	+ 0,25 - 0,25	+ 0,25 - 0,25	+ 0,3 - 0,3	+ 0,15 - 0,15	+ 0,1	+ 0,35	- 0,05	- 0,05

t_{S1} mm	t_{S2} mm	t_M mm	t_R mm	weight per area kg/m²
0,41	0,37	0,07	0,79	2,85
- 0,02	- 0,04	- 0,01	- 0,04	+ 0,17 - 0,05

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
317,7 Nm²/m	100,1 Nm²/m	2401 N/m	68,4 Nm/m	68,4 Nm/m

$M_{b,pos}$: outer skin under pressure

$M_{b,neg}$: inner skin under pressure

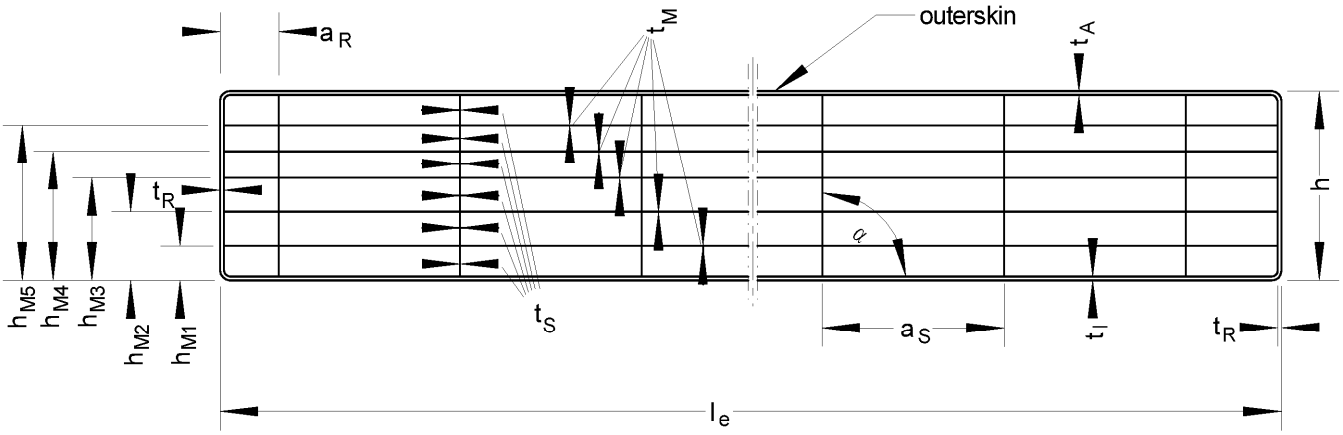
Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.12
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Akyver Sun Type 20/7w-12"	

Deutsches Institut für Bautechnik DIBt

Sheet: **Makrolon multi UV 7/20-14**
Manufacturer: **Exolon Group S.p.A., Nera Montoro**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	weight per area kg/m²
2100	19,6	3,6	6,6	9,6	12,6	15,9	13,8	8,0	2,85
+ 6 - 2	± 0,5	+ 0,3 - 0,25	+ 0,2 - 0,3	+ 0,25 - 0,3	+ 0,3 - 0,2	+ 0,25 - 0,3	+ 0,4	+ 2,4	+ 0,17 - 0,06

t_A mm	t_I mm	t_S mm	t_M mm	t_R mm	difference $\lvert\Delta\alpha\rvert$ to 90°
0,63	0,65	0,33	0,07	0,85	
- 0,07	- 0,09	- 0,07	- 0,02	- 0,43	≤ 6°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
320 Nm²/m	56,6 Nm²/m	1925 N/m	63,4 Nm/m	71,4 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

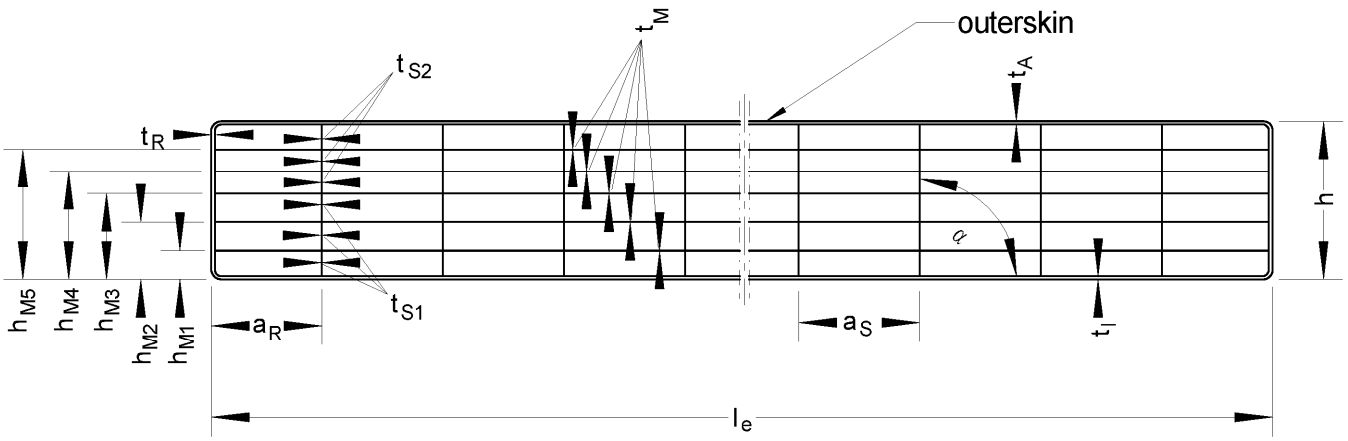
Dachlichtband Alphaglas gewölbt Typ MS 70

Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Makrolon multi UV 7/20-14"

Annex A 4.13

Deutsches Institut für Bautechnik DIBt

Sheet: **Macrolux Multiwall LL 7W - 20 mm**
Manufacturer: **Stabilit Suisse S.A.**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	t_A mm	t_I mm
2100	20,2	3,3	6,0	8,7	12,3	16,2	15,8	13,8	0,67	0,71
+ 6 - 2	± 0,5	+ 0,55 - 0,3	+ 0,7 - 0,6	+ 0,75 - 0,6	+ 0,7 - 0,8	+ 0,3 - 0,4	+ 0,35	+ 2,9	- 0,07	- 0,11

t_{S1} mm	t_{S2} mm	t_M mm	t_R mm	weight per area kg/m²	difference $\lvert\Delta\alpha\rvert$ to 90°
0,52	0,36	0,09	0,60	3,08	
- 0,14	- 0,09	- 0,03	- 0,10	+ 0,18 - 0,11	≤ 3°

Minimum performance levels or classes for the sheets
(as declared in the DoP in accordance with EN 16153:2015)

mechanical resistance (deformation behavior)				
B_x	B_y	S_y	$M_{b,pos}$	$M_{b,neg}$
292,7 Nm²/m	75,1 Nm²/m	2843 N/m	81,9 Nm/m	76,5 Nm/m

$M_{b,pos}$: outer skin under pressure
$M_{b,neg}$: inner skin under pressure

Durability, as variation (after ageing)			
of yellowness index	of the light transmittance	of deformation flexural modulus	of tensile strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

Reaction to fire: Class B-s2,d0 in accordance with EN13501-1

Dachlichtband Alphaglas gewölbt Typ MS 70	Annex A 4.14
Geometry/ weight per area, Minimum performance levels or classes for the sheets in accordance with EN 16153:2015 "Macrolux Multiwall LL 7W - 20 mm"	

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Alphaglas gewölbt Typ MS 70 **Annex B**

Provisions for design and dimensioning

Dimensioning, installation and execution of the roof kit shall be in compliance with the national technical specifications. These differ in terms of their content as well as their status within the legal frameworks of the member states.

If no national provisions exist, dimensioning can be carried out in accordance with Annexes B 1, B 2 and B 3. In case the roof system, in particular the multi-wall sheets are systematically in contact with chemicals, the resistance to these substances shall be checked. Thereby, high concentrations of chemicals in the surrounding air shall be also considered.

Installation, packaging, transport, storage as well as use, maintenance and repair shall be carried out in accordance with the manufacturer's instructions (extract see Annex C).

B 1 Load-bearing capacity and serviceability of the covering

B 1.1 General

The design and arrangement of the multi-wall sheets as described in Section 1.1.1 in the translucent roof kit shall correspond to the specifications given in Annexes A 1 to A 4. The specifications given in Section 2 shall be complied with.

The stability shall be verified for the ultimate limit state (ULS)

$E_d \leq R_d$

and for the serviceability limit state (SLS)

$E_d \leq C_d$.

E_d: design value of the action

R_d: design value of the structural resistance for verification of the ultimate limit state

C_d: design value of the structural resistance for verification of the serviceability limit state

The multi-wall sheets shall not be used for bracing the aluminium structure.

The multi-wall sheets shall not be walked on.

Assessment pertaining to fall-through protection is not included in this ETA.

B 1.2 Design values for actions, E_d

The action resulting from the dead weight of the multi-wall sheets may be neglected in the roof kit verifications. Live loads are not permitted.

The design values for the actions shall be determined in accordance with the applicable European specifications.

The actions E_k shall be increased through multiplication by the factors C_t in consideration of the action duration and based on load.

Load action	Duration of load action	C_t
Wind	very short	1.00
Snow as an extraordinary snow load (e.g. in the low-lying plains of northern Germany)	short: up to one week	1.15
Snow	medium: up to three months	1.20

For the wind and temperature effects to be considered in the load case 'summer' the ψ coefficient defined in EN 1990[1] may be applied. In design situations where the wind is applied as the dominant variable action, the ψ coefficient may be considered in the design value of the structural resistance R_d (see Section B.1.3).

If the roof kit is installed with a substructure angle $\alpha \leq 45°$ in roofs with pitches $\leq 20°$ the negative wind pressure loads (wind suction loads) may be applied in simplified form as acting on the transluscent roof kit area with a constant aerodynamic coefficient c_p.

$$w_e = q_p(z_e) \cdot c_p$$

The gust velocity pressure $q_p(z_e)$ shall be taken from EN 1991-1-4[2].

The coefficient c_p shall be selected in accordance with the roof position and type. For enclosed buildings in which the translucent roof kit is installed in the region H, I or N in accordance with Sections 7.2.3 to 7.2.7 of EN 1991-1-4:2010-12 the external pressure coefficient is $c_{pe} = -0.7$.

If the roof kit is installed on the ridge of a mono-gable roof or a hipped end roof in the region J or K in accordance with Section 7.2.5 or 7.2.6 of EN 1991-1-4:2010-12 with a roof pitch $> 10°$ the factor $c_{pe} = -1.2$ applies for enclosed buildings and $c_{p,net} = -2.0$ for freestanding roofs.

In case of conditions deviating from the specified conditions or use of translucent roof kit in region F, G, L or M in accordance with Sections 7.2.3 to 7.2.7 of EN 1991-1-4:2010-12 the verifications shall be done applying special loads (see Section 1.5 of EN 1991-1-4).

B 1.3 Design values for structural resistance R_d and C_d

The design values for structural resistance R_d and C_d result from the characteristic value of structural resistance R_k in consideration of the material safety factor γ_M, the factor taking into account the effects of media C_u and the temperature factor C_θ as follows:

$$R_d = \frac{R_k}{\gamma_{MR} \cdot C_u \cdot C_\theta} \qquad C_d = \frac{C_k}{\gamma_{MC} \cdot C_u \cdot C_\theta}$$

The following factors shall be applied:

Factor taking into account the effects of media and ageing C_u		1.10
Temperature factor C_θ	Summer (70°C)	1.20
	winter	1.00

The following material safety factors shall be applied as a function of the consequence class (CC) in accordance with EN 1990:

Consequence class	Material safety factor γ_{MR}	Material safety factor γ_{MC}
CC 1	1.25	1.09
CC 2	1.30	1.13

In design situations where wind is considered to be the dominant variable action, the reduction in structural resistance due to temperature may be reduced by means of the ψ coefficient for the summer load case. For this design situation a reduction factor for temperature of $C'_\theta = 1 + \psi \cdot (C_\theta - 1.0)$ may be applied.

The characteristic values for structural resistance R_k and C_k shall be taken from the tables in Annex B 3.1 for the given multi-wall sheets and direction of loading.

[1] EN 1990:2010-12 Eurocode: Basis of structural design; German version EN 1990 A1:2005 + A1:2005/AC:2010

[2] EN 1991-1-4:2010-12 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

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B 2 Load-bearing capacity and serviceability of the mounting angle if made of GRP

B 2.1 General

The implementation and arrangement of the GRP- mounting angle in accordance with Section 1.1.5 correspond to the specifications given in Annexes A 2.2.1 to A 2.4.3.

The mounting angle is used to take up compressive forces. The compressive forces from wind and snow loads are introduced into the imposts and the subconstruction.

Verification is done on the plane of the acting compressive force F_D. For each application case the stability verification shall be done for the ultimate limit state;

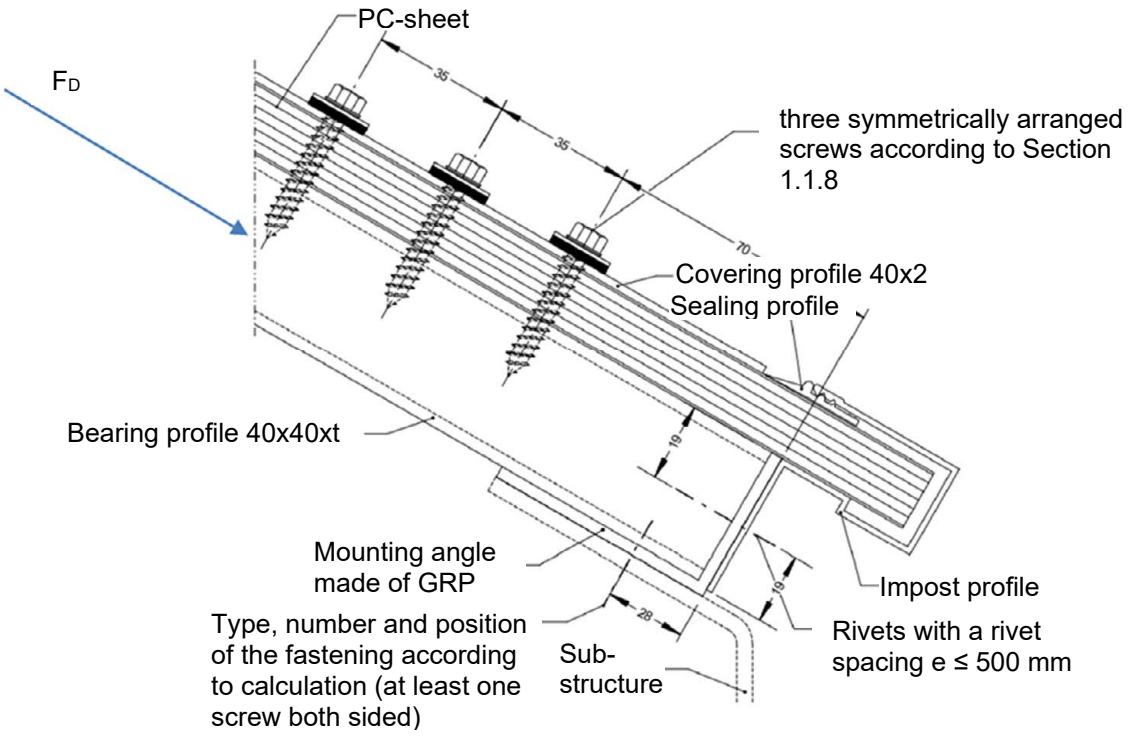
$$\frac{F_{D,E,d}}{F_{D,R,d}} \leq 1{,}0$$

$F_{D,E,d}$: design value of the action

$F_{D,R,d}$: design value for structural resistance

shall be adhered to.

The verification of the serviceability limit state shall be deemed provided with the verification of the ultimate limit state for load-bearing capacity.



B 2.2 Design value of the action, $F_{D,E,d}$

The design values for the action shall be determined in accordance with the applicable European specifications.

The design value of the action $F_{D,E,d}$ results from the characteristic value of the snow load in consideration of the partial safety factor γ_F, the coefficient ψ and a factor taking into account the duration of the action K_t.

The characteristic action shall be multiplied by the factor K_t.

The following factors shall be applied:

Load action	Duration of load action	K_t
Snow as an extraordinary snow load (e.g. in the low-lying plains of northern Germany)	short: up to one week	1.3
Snow	medium: up to three months	1.4

B 2.3 Design value of the structural resistance, $F_{D,R,d}$

The design value for structural resistance $F_{D,R,d}$ results from the characteristic value of structural resistance $F_{D,R,k}$ in consideration of the material safety factor γ_M. (Taking into account the factor of the effects of media and the temperature factor is not necessary for inside components):

$$F_{D,R,d} = \frac{F_{D,R,k}}{\gamma_M}$$

with
γ_M = 1,35
$F_{D,R,k}$ = 1,84 kN

B 3 Load-bearing capacity and serviceability of the tensile anchorage of the covering profile 40x2

B 3.1 General

The arrangement of the connecting devices in accordance with Section 1.1.8 correspond to the specifications given in Annexes A 2.4.1 to A 2.4.3.

Via the connection covering profile 40x2 and bearing profile 40x40xt, tensile forces from uplift loads by wind are introduced into the imposts and the subconstruction.

Verification is done on the plane of the acting tensile force F_Z.

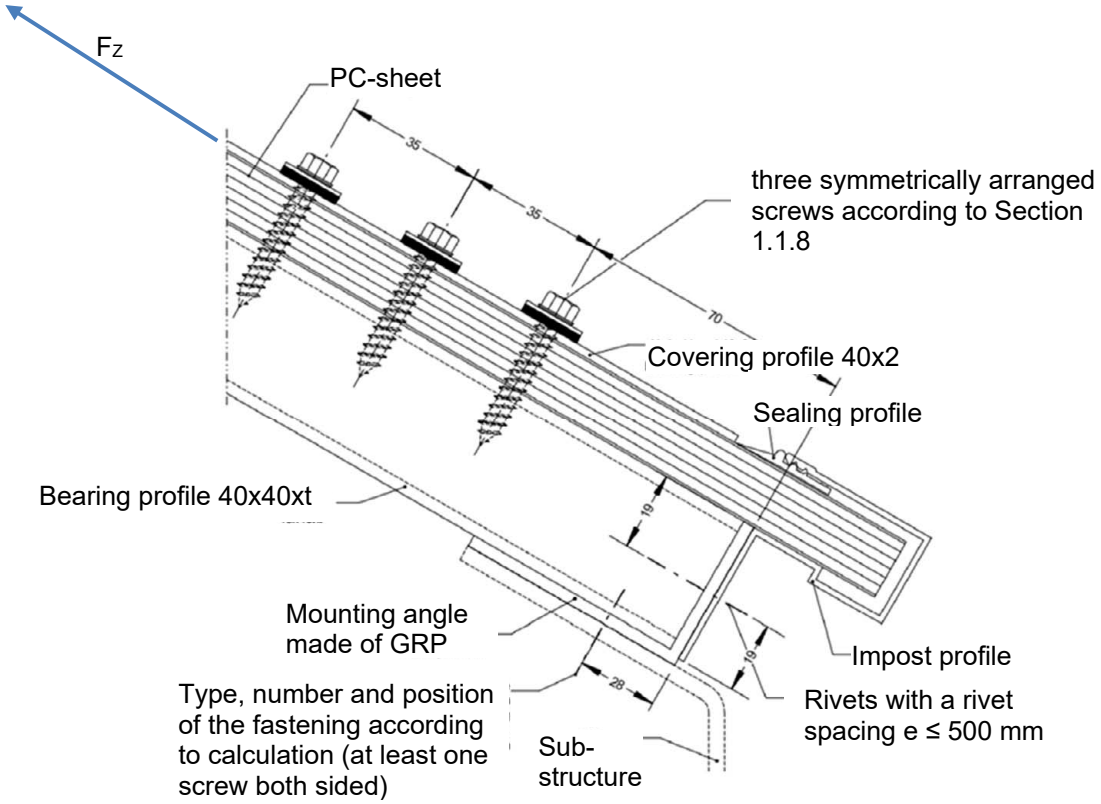
For each application case the stability verification shall be done.

For the ultimate limit state: $\frac{F_{Z,E,d}}{F_{Z,R,d}} \leq 1{,}0$,

for the serviceability limit state: $\frac{F_{Z,E,d}}{F_{Z,C,d}} \leq 1{,}0$,

$F_{Z,E,d}$: design value of the action
$F_{Z,R,d}$: design value for structural resistance (ultimate limit state)
$F_{Z,C,d}$: design value for structural resistance (serviceability limit state)

shall be adhered to.



B 3.2 Design value of the action, $F_{Z,E,d}$

The design values for the action shall be determined in accordance with the applicable European specifications.

The design value of the action $F_{Z,E,d}$ results from the characteristic value of the uplift windload in consideration of the partial safety factor γ_F and the coefficient ψ.

B 3.3 Design value of the structural resistance, $F_{Z,R,d}$/ $F_{Z,C,d}$

For the connection of the covering profile 40x2 and the bearing profile 40x40xt ($t \geq 3$)), the characteristic value of the load transmitted via the screws strained by shear force may be taken from the following table:

Components to be connected	Characteristic value of structural resistance	
	ultimate limit state: $F_{Z,R,k}$	serviceability: $F_{Z;C,k}$
Covering profile 40x2/ bearing profile 40x40xt ($t \geq 3$), to be connected with 3 screws	14,7 kN	3,0 kN

The design value of the structural resistance $F_{Z,R,d}$/ $F_{Z,C,d}$ results from the characteristic value of the structural resistance $F_{Z,R,k}$/ $F_{Z,C,k}$ under consideration of the material safety factor γ_M (in accordance with EN 1999-1-4[3]).:

$$F_{Z,R,d} = \frac{F_{Z,R,k}}{\gamma_{MR}} = \frac{14,7}{1,25} \quad = 11,76 \text{ kN}$$

$$F_{Z,C,d} = \frac{F_{Z,C,k}}{\gamma_{MC}} = \frac{3,0}{1,0} \quad = 3,0 \text{ kN}$$

[3] EN 1991-1-4:2007+AC:2009 Eurocode 9 - Design of aluminium structures - Part 1-4: Cold-formed structural sheeting

B 4 Characteristic structural resistances

B 4.1 Characteristic structural resistances of the covering

Covering "PC 10+10" – Annexes A 4.1 – A 4.6

Multi-wall sheet in accordance with Annex	Radius R ≥ 1,50m R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
2 x A 4.1 Akyver Sun Type 10/4w-7 1750	≤ 3,00	2-span	1,06	3,88	3,88	4,66	3,05
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	2,73	2,73	3,04	1,89
		4-span	0,53	8,66	8,66		
2 x A 4.2 Makrolon multi UV 4/10-6	≤ 3,00	2-span	1,06	3,89	3,89	4,34	2,84
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	2,74	2,74	2,83	1,76
		4-span	0,53	8,68	8,68		
2 x A 4.3 Policarb 10mm 5w 1,8kg/m²	≤ 3,00	2-span	1,06	3,89	3,89	4,59	3,00
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	2,74	2,74	2,99	1,86
		4-span	0,53	8,68	8,68		
2 x A 4.4 Policarb 10mm 4w 1,75kg/m²	≤ 3,00	2-span	1,06	3,89	3,89	4,01	2,62
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	2,74	2,74	2,61	1,63
		4-span	0,53	8,68	8,68		
2 x A 4.5 Macrolux Multiwall LL 4W-10-1,7kg/m²	≤ 3,00	2-span	1,06	3,89	3,89	4,90	3,20
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	2,74	2,74	3,19	1,99
		4-span	0,53	8,68	8,68		
2 x A 4.6 Lexan Thermoclear LT2UV105R175	≤ 3,00	2-span	1,06	3,89	3,89	4,38	2,86
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	2,74	2,74	2,85	1,78
		4-span	0,53	8,68	8,68		

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Covering "PC 16" – Annexes A 4.7 – A 4.11

Multi-wall sheet in accordance with Annex	Radius R ≥ 2,40m R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.7 Akyver Sun Type 16/7w-12 2700	≤ 3,00	2-span	1,06	3,01	2,95	3,62	2,45
A 4.8 Makrolon Multi UV 7/16-14	≤ 3,00	2-span	1,06	2,60	2,55	3,13	2,08
A 4.9 Policarb 16mm 7w 2,6kg/m²	≤ 3,00	2-span	1,06	2,45	2,40	2,94	1,99
A 4.10 Makrolux Multiwall LL 7W-16 2,6kg/m²	≤ 3,00	2-span	1,06	2,47	2,42	2,97	1,97
A 4.11 Makrolux Multiwall HC-16 mm	≤ 3,00	2-span	1,06	2,92	2,90	3,46	2,25

Covering "PC 20" – Annexes A 4.12 – A 4.14

Multi-wall sheet in accordance with Annex	Radius R ≥ 2,40m R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.12 Akyver Sun Type 20/7w-12	≤ 3,00	2-span	1,06	2,53	2,48	3,29	2,23
A 4.13 Makrolon multi UV 7/20-14	≤ 3,00	2-span	1,06	2,51	2,46	3,45	2,33
A 4.14 Macrolux Multiwall LL 7W-20–3,1kg/m²	≤ 3,00	2-span	1,06	3,01	2,95	3,62	2,45

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Covering "PC 16+10" – Annexes (A 4.1 – A 4.5) + (A 4.7 – A 4.11)

Multi-wall sheet in accordance with Annex	Radius R ≥ 2,40m R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.1 Akyver Sun Type 10/4w-7 1750 + A 4.7 Akyver Sun Type 16/7w-12 2700	≤ 3,00	2-span	1,06	5,38	4,67	5,40	3,52
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	4,65	4,06	3,64	3,09
		4-span	0,53	8,68	8,68		
A 4.2 Makrolon multi UV 4/10-6 + A 4.8 Makrolon multi UV 7/16-14	≤ 3,00	2-span	1,06	4,67	4,04	4,90	3,20
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	4,03	3,52	3,31	2,81
		4-span	0,53	8,68	8,68		
A 4.3 Policarb 10mm 5w 1,8kg/m² + A 4.9 Policarb 16mm 7w 2,6kg/m²	≤ 3,00	2-span	1,06	4,40	3,81	4,60	3,00
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,80	3,31	3,11	2,64
		4-span	0,53	8,68	8,68		
A 4.4 Policarb 10mm 4w 1,75kg/m² + A 4.9 Policarb 16mm 7w 2,6kg/m²	≤ 3,00	2-span	1,06	4,40	3,81	4,60	3,00
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,80	3,31	3,11	2,64
		4-span	0,53	8,68	8,68		
A 4.5 Makrolux Multiwall LL 4W-10 1,7 kg/m² + A 4.10 Makrolux Multiwall LL 7W-16 2,6kg/m²	≤ 3,00	2-span	1,06	4,43	3,84	4,65	3,03
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,82	3,34	3,14	2,67
		4-span	0,53	8,68	8,68		

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Multi-wall sheet in accordance with Annex	Radius R ≥ 2,40m R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.5 Makrolux Multiwall LL 4W-10 1,7 kg/m² + A 4.11 Makrolux Multiwall HC-16 mm	≤ 3,00	2-span	1,06	5,01	4,52	5,63	3,70
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	4,66	4,07	3,83	3,25
		4-span	0,53	8,68	8,68		
A 4.3 Policarb 10mm 5w 1,8 kg/m² + A 4.7 Akyver Sun Type 16/7w-12 2700	≤ 3,00	2-span	1,06	5,40	4,68	5,31	3,47
		4-span	0,53	16.5	16.5		
	≤ 4,70	2-span	1,06	4,66	4,07	3,59	3,04
		4-span	0,53	8,68	8,68		
A 4.4 Policarb 10mm 4w 1,75kg/m² + A 4.7 Akyver Sun Type 16/7w-12 2700	≤ 3,00	2-span	1,06	5,40	4,68	4,65	3,03
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	4,66	4,07	3,14	2,66
		4-span	0,53	8,68	8,68		
A 4.1 Akyver Sun Type 10/4w-7 1750 + A 4.9 Policarb 16mm 7w	≤ 3,00	2-span	1,06	4,40	3,81	4,60	3,00
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,80	3,31	3,11	2,64
		4-span	0,53	8,68	8,68		

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Covering "PC 20+10" – Annexes (A 4.1 – A 4.6) + (A 4.12 – A 4.14)

Multi-wall sheet in accordance with Annex	Radius R ≥ 2,40m R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.1 Akyver Sun Type 10/4w-7 1750 + A 4.12 Akyver Sun Type 20/7W-12	≤ 3,00	2-span	1,06	4,54	3,94	5,16	3,37
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,92	3,42	3,49	2,96
		4-span	0,53	8,68	8,68		
A 4.2 Makrolon multi UV 4/10-6 + A 4.13 Makrolon multi UV 7/20-14	≤ 3,00	2-span	1,06	4,52	3,91	5,03	3,28
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,90	3,40	3,39	2,88
		4-span	0,53	8,68	8,68		
A 4.5 Macrolux Multiwall LL 4W-10-1,7kg/m² + A 4.14 Makrolux Multiwall LL 7W-20	≤ 3,00	2-span	1,06	5,40	4,68	5,67	3,70
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	4,66	4,07	3,83	3,25
		4-span	0,53	8,68	8,68		
A 4.3 Policarb 10mm 5w 1,8 kg/m² + A 4.12 Akyver Sun Type 20/7w-12	≤ 3,00	2-span	1,06	4,54	3,94	5,16	3,37
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,92	3,42	3,49	2,96
		4-span	0,53	8,68	8,68		
A 4.4 Policarb 10mm 4w 1,75kg/m² + A 4.12 Akyver Sun Type 20/7w-12	≤ 3,00	2-span	1,06	4,54	3,94	4,65	3,03
		4-span	0,53	16,5	16,5		
	≤ 4,70	2-span	1,06	3,92	3,42	3,14	2,66
		4-span	0,53	8,68	8,68		

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B 4.2 Characteristic structural resistances of the fasteners on the impost

For the connections of the covering profile 70 and the bearing profile 70 with the fixing bracket, the values from the following table may be used as characteristic structural resistances of the tensile strength for each pair of screws.

Components to be connected	Tensile load-bearing capacity $N_{R,k}$
fixing bracket/ covering profile 70 to be connected with 2 screws	17,25 kN
fixing bracket/ bearing profile 70 to be connected with 2 screws	13,56 kN

(The material safety factor γ_M to be considered is taken from EN 1999-1-4)

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Dachlichtband Alphaglas gewölbt Typ MS 70 **Annex C**

Thermal resistance

If requirements as to the thermal resistance of the roof kit are imposed, the thermal transmittance U_{CW} shall be determined in accordance with EN ISO 10077-1[1] as the resultant of the thermal transmittance coefficients of the covering, weighted on the basis of the area as well as the length-weighted values of linear thermal transmittance coefficients ψ of the connecting profiles.

The respective area fractions shall be calculated for the translucent roof kit. For the calculation of the design value of the thermal transmittance coefficient U_{CW} of the translucent roof kit, the following equation shall be used:

$$U_{cw} = \frac{\sum (U_p \cdot A_p) + \sum (\Psi_f \cdot l_f)}{A_{ges}} \quad \text{in W/(m²·K)}$$

where:

U_P: = thermal transmittance coefficient of the PC multi-wall sheets in W/(m²K)

A_P: = area of the PC multi-wall sheets in m^2

ψ_f: = linear thermal transmittance coefficient at the level of the connecting profiles in W/(m K)

l_f: = connecting profile length in m

A_{ges}: = total area of the roof kit in m²

The values of thermal transmittance U_P of the coverings and ψ_f of the connections shall be taken from Annex C.

In case the substructure is taken into account, the thermal transmittance U_Z shall be determined in accordance with the applicable European specifications e.g. EN ISO 6946[2].

C 1 Thermal transmittance coefficients of the coverings

Table C 1

Covering	Multi-wall sheet(s) as described in Annex	Vertical installation U_P [W/(m²·K)]	Horizontal installation U_P [W/(m²·K)]
PC 16	A 4.7 to A 4.11	1.8	1.9
PC 20	A 4.12 to A 4.14	1.5	1.6
PC 10 + 10	A 4.1 to A 4.6	1.4	1.4
PC 16 + 10	A 4.7 to A 4.11	1.2	1.2
	A 4.1 to A 4.6		
PC 20 + 10	A 4.12 to A 4.14	1.1	1.1
	A 4.1 to A 4.6		

[1] EN ISO 10077-1:2016 Thermal performance of windows, doors and shutters - Calculation of thermaltransmittance - Part 1: General (ISO/FDIS 10077-1:2016)

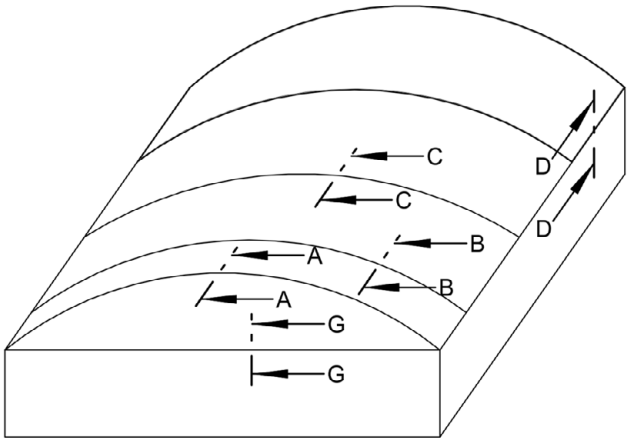
[2] EN ISO 6946:2008 Building components and building elements - Thermal resistance and thermal transmittance - Calculation method (ISO 6946:2007)

The thermal transmittance coefficients U_P depend on the selected covering as well as in part on the multi-wall sheet used and the installation position. Differentiation is made between vertical installations (horizontal heat flow) and horizontal installations (upwards heat flow).

For the purposes of comparing the coverings in terms of EN 673[3] the U_P value for vertical installations shall be used.

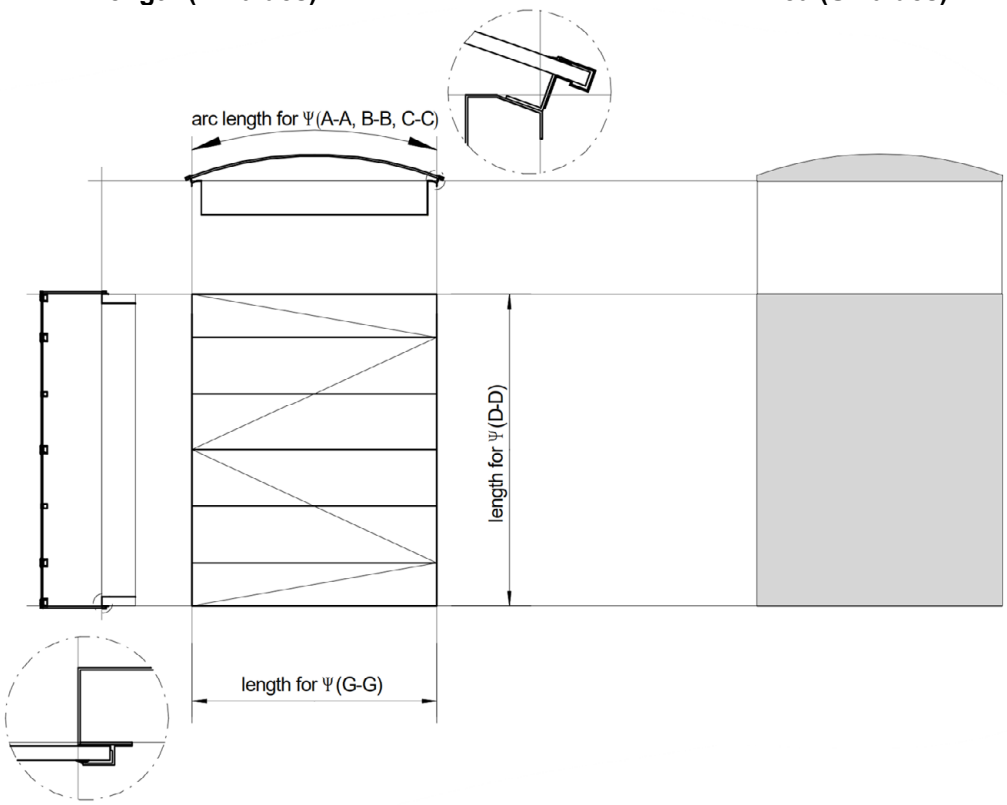
C 2 Linear thermal transmittance coefficients at the level of the bearing profiles

The sections correspond to those given in Annexes A.1 and A.2.



The following dimensional references shall be applied in the calculation:

Length (Ψ values) **Area (U-values)**



[3] EN 673:2011 Glass in building - Determination of thermal transmittance (U value) - Calculation method

Table C 2: Linear thermal transmittance coefficients at the level of the bearing profiles

Covering	Multi-wall sheet(s) as described in Annex	Bearing profile hight [mm]	Ψ_{B-B} [W/(m·K)]	Ψ_{C-C} [W/(m·K)]
PC 16	A 4.7 to A 4.11	40	0,011	0,002
		60	0,016	0,007
PC 20	A 4.12 to A 4.14	40	0,016	0,002
		60	0,020	0,005
PC 10+10	A 4.1 to A 4.6	40	0,017	0,000
		60	0,020	0,003
PC 16+10	A 4.7 to A 4.11 A 4.1 to A 4.6	40	0,020	0,001
		60	0,022	0,003
PC 20+10	A 4.12 to A 4.14 A 4.1 to A 4.6	40	0,021	0,001
		60	0,023	0,003

The thermal transmittance coefficients ψ_f at the level of the bearing profiles depend on the selected covering as well as in part on the multi-wall sheet used.

For section B–B (sheet butt joint) and section C–C (bearing profile in middle of sheet) the thermal transmittance coefficients shall be taken from Table C 2. The thermal effect of the fasteners may be neglected. For deviating executions additional verifications are required.

C 3 Linear thermal transmittance at the level of the impost

The thermal transmittance coefficients Ψ_f for section D-D depend on the selected covering and can be taken from the tables below. Details of section E-E and F-F in accordance with Annex A 2.3 have no effect on the heat flows and can hence be neglected. For deviating executions additional verifications are required. At the level of the eaves-side connection three different variants can be calculated:

Table C 3.1: Linear thermal transmittance coefficients for mounting angle in aluminium

Covering	Multi-wall sheet(s) as described in Annex	Bearing profile hight [mm]	Ψ_{D-D} [W/(m·K)]
PC 16	A 4.7 to A 4.11	40	0,443
		60	0,435
PC 20	A 4.12 to A 4.14	40	0,447
		60	0,442
PC 10+10	A 4.1 to A 4.6	40	0,447
		60	0,443
PC 16+10	A 4.7 to A 4.11 A 4.1 to A 4.6	40	0,449
		60	0,447
PC 20+10	A 4.12 to A 4.14 A 4.1 to A 4.6	40	0,449
		60	0,449

Table C 3.2: Linear thermal transmittance coefficients for mounting angle in GF-UP

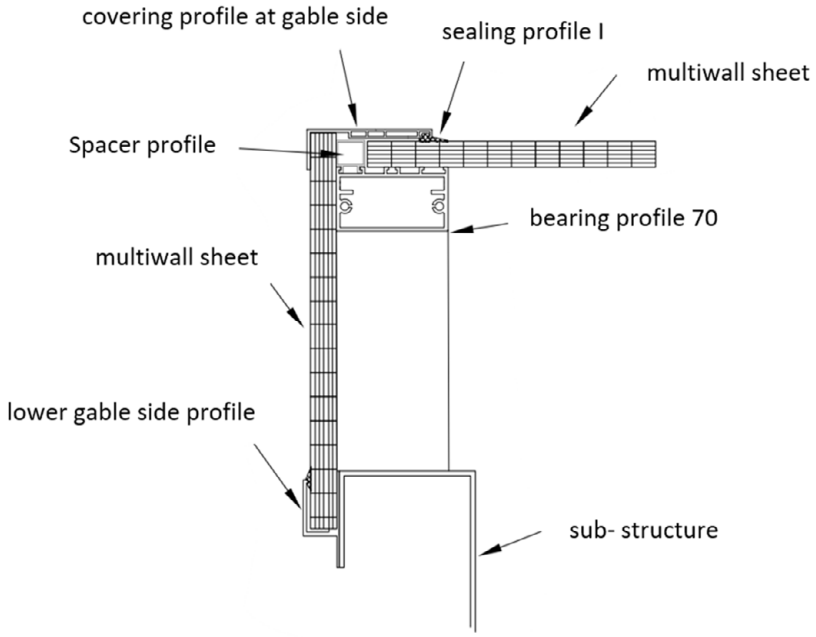
Covering	Multi-wall sheet(s) as described in Annex	Bearing profile hight [mm]	Ψ_{D-D} [W/(m·K)]
PC 16	A 4.7 to A 4.11	40	0,237
		60	0,292
PC 20	A 4.12 to A 4.14	40	0,241
		60	0,299
PC 10+10	A 4.1 to A 4.6	40	0,241
		60	0,301
PC 16+10	A 4.7 to A 4.11 A 4.1 to A 4.6	40	0,242
		60	0,304
PC 20+10	A 4.12 to A 4.14 A 4.1 to A 4.6	40	0,242
		60	0,306

Table C 3.3: Linear thermal transmittance coefficients for mounting angle in GF-UP and insulating board

Covering	Multi-wall sheet(s) as described in Annex	Bearing profile hight [mm]	Ψ_{D-D} [W/(m·K)]
PC 16	A 4.7 to A 4.11	40	-0,034
		60	-0,001
PC 20	A 4.12 to A 4.14	40	-0,021
		60	0,012
PC 10+10	A 4.1 to A 4.6	40	-0,016
		60	0,015
PC 16+10	A 4.7 to A 4.11 A 4.1 to A 4.6	40	-0,009
		60	0,022
PC 20+10	A 4.12 to A 4.14 A 4.1 to A 4.6	40	-0,006
		60	0,025

C 4 Linear thermal transmittance at the gable side

The gable side is assembled as follows:



The thermal transmittance coefficients Ψ_f for section A-A and G-G depend on the selected covering and can be taken from the tables below. For deviating executions additional verifications are required.

Table C 4.1: Linear thermal transmittance coefficients for section A-A

Covering	Multi-wall sheet(s) as described in Annex	Gable side sheet	Multi-wall sheet(s) as described in Annex	Bearing profile hight [mm]	Ψ_{A-A} [W/(m·K)]
PC 16	A 4.7 to A 4.11	PC 16	A 4.7 to A 4.11	40	-0,078
				60	-0,083
PC 20	A 4.12 to A 4.14	PC 10+10	A 4.1 to A 4.6	40	-0,061
				60	-0,064
PC 10+10	A 4.1 to A 4.6			40	-0,055
				60	-0,058
PC 16+10	A 4.7 to A 4.11 A 4.1 to A 4.6			40	-0,051
				60	-0,054
PC 20+10	A 4.12 to A 4.14 A 4.1 to A 4.6			40	-0,050
				60	-0,054

Table C 4.2: Linear thermal transmittance coefficients for section G-G

Gable side sheet	Multi-wall sheet(s) as described in Annex	Ψ_{G-G} [W/(m·K)]
PC 16	A 4.7 to A 4.11	-0,093
PC 10+10	A 4.1 to A 4.6	-0,070

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Dachlichtband Alphaglas gewölbt Typ MS 70 **Anlage D**

Provisions for installation, packaging, transport, storage, use, ıance and repair

D 1 Installation

The fixing of the roof kit on the substructure is not covered by this ETA. The stability shall be verified for the relevant substructure in accordance with the applicable European specifications depending on the substructure.

Before the roof kit is installed, the dimensional stability of the substructure shall be checked. Particular care shall be taken to ensure that the substructure has a rectangular footprint. The compliance of the existing substructure with the substructure for which the load-bearing capacity was verified in the planning stage shall be checked visually.

The installation of the roof kit may only be performed by specialists who are specially trained for this purpose. The installation guidelines of the manufacturer shall be respected. The manufacturer of the roof kit shall inform the specialists that they may only carry out assembly and installation of the roof kit in accordance with his instructions and the provisions of the ETA. The hollow chambers of the multi-wall sheets shall not be filled.

If the translucent roof kit can systematically come into contact with chemical substances, the resistance of the multi-wall sheets and if necessary of other kit components to these substances shall be verified.

During installation, the multi-wall sheets are placed on the pre-installed bearing profiles and pushed into the impost profiles. Above each bearing profile, the PC sheets are saved against uplift loads by covering profiles which act as tension straps. They are connected to the fixing bracket with screws according to section 1.1.8; the screw must be screwed at least 30 mm into the screw channel (Annex A 2.3).

For the intermediate support arches, the covering profiles are screwed to the bearing profiles (see Annex A 2.4).

The impost profile is screwed to the mounting angle (see Annex A 2.2).

The arrangement of the supporting rungs creates single and multi-span systems for multiwall sheets with a maximum support spacing a_P according to Annex A 1.1 to A 1.4. Fittings may be installed as single-span systems without additional support arches: up to 350 mm wide at 4-span-systems and up to 500 mm wide at 2-span-systems.

The multiwall sheets are joined at the longitudinal edges over a bearing profile; the support width must be at least 29 mm both in the bearing profile and in the edge profile (Annex A 2.1, sections A-A and B-B).

The maximum sheet width is 2100 mm. At the impost the multi-wall sheets shall be kept adjustable in accordance with the specifications given in Annex A 2.2, at least 35 mm.

Components connected to the side of the rooflight system, such as gable connections or head pieces, must not be friction-locked so as not to impede the deformation of the arches.

If the textile glass mat or 2 mm - 4 mm solid sheets are installed as required, the Multiwall sheets must be fully covered (including the support area).

The translucent roof kit shall be installed and connected to the adjacent structure in a manner that ensures no moisture can penetrate into it and avoiding thermal bridges. These details shall be evaluated on a case-by-case basis.

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D 2 Packaging, transport and storage

The components of the roof kit shall be stored and transported in accordance with the manufacturer's specifications such that the components cannot be damaged. In particular, for multi-wall sheets made from polycarbonate it shall be ensured that only those surfaces with UV protective coatings are exposed to UV radiation. The packaging shall protect the material from moisture and weather effects whilst avoiding heat build-up inside the packaging. It is the responsibility of the manufacturer to ensure that this information is passed on to the people in charge.

D 3 Use, maintenance, repair

The installed roof kit is not a walk-on system. For installation purposes, the rooflight system can be walked on with a special mounting aid system, which is mounted transversely to the supporting profiles.

For maintenance, the installed roof kit shall be visually inspected by a qualified expert after four years and then every two years. The manufacturer shall be consulted if the PC multi-wall sheets show surface cracks or damage or if they are strongly discoloured. The aluminium components of the roof kit shall be examined for pronounced corrosion by visual inspection. Repair shall be arranged where necessary.

Only the components listed in the ETA may be used for replacement of components.

Cleaning agents shall be free of solvents and abrasives. Chemical and biological cleaning additives may only be used if they have been proven to be compatible with polycarbonate; otherwise only water and a soft cloth shall be used to clean the multi-wall sheets.