

Approval body for construction products  
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and  
Laender Governments



## European Technical Assessment

**ETA-19/0625  
of 10 May 2023**

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

ATTRIA Bogenlichtband BLB

Product family  
to which the construction product belongs

Self supporting translucent roof kits

Manufacturer

ATTRIA production GmbH  
Gewerbepark Mitterfeld 7  
2523 TATTENDORF  
ÖSTERREICH

Manufacturing plant

ATTRIA production GmbH  
Gewerbepark Mitterfeld 7  
2523 TATTENDORF  
ÖSTERREICH

This European Technical Assessment  
contains

28 pages including 21 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 'ATTRIA Bogenlichtband BLB' is a self-supporting translucent roof kit made up of components which are factory-made and assembled on site.

The static system of the 'ATTRIA Bogenlichtband BLB' 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<sup>1</sup>.

The roof kit comprises 1.05 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 impost in base profiles. The multi-wall sheets are abutted along their longitudinal edges via a bearing profile. For the double-span systems resp. the triple-span-system one resp. two additional support profile/s is/are arranged as intermediate support parallel to the end arches.

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

'ATTRIA Bogenlichtband BLB'

- translucent polycarbonate (PC) multi-wall sheets of thickness 16 mm (PC 16)
- base, bearing, covering and support profiles made of aluminium,
- aluminium glazing beads and fixing brackets
- aluminium profiles (optionally used)
- 1,1 mm GF-UP-sheet (optionally arranged inside under the covering)
- 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<sup>2</sup> of this European technical assessment.

#### 1.1.1 Multi-wall sheets

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

Table 1: PC-sheets

Manufacturer	Trade name	Sheet height [mm]	Annex
dott.gallina s.r.l. IT – La Loggia	Polcarb 16mm 6W	16	A 4.1
	Polcarb 16mm 7W	16	A 4.2
CORPLEX, Kaysersberg F – Kaysersberg	Akyver Sun Type 16/7W-12 2600	16	A 4.3
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 7/16-14	16	A 4.4
Stabilit Suisse S.A. CH – Stabio	Makrolux Multiwall LL 7W-16- 2.6 kg/m <sup>2</sup>	16	A 4.5

- <sup>1</sup> EAD 22089 00-0401 Self supporting translucent roof kits with covering made of plastic sheets; edition march 2019
- <sup>2</sup> 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
- <sup>3</sup> 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

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

#### 1.1.2 Bearing -, covering- and support profiles

The aluminium profiles are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2<sup>4</sup> and have the dimensions given in Annex A 3.1 of the ETA. The Bearing -, covering- and support profiles are pre-bent according to the intended radius.

#### 1.1.3 Base profiles

The base profiles 1 and 2 are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2. They have the dimensions given in Annex A 3.2 of the ETA.

#### 1.1.4 Glazing beads

The glazing bead at the impost are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2. They have the dimensions given in Annex A 3.3 of the ETA.

#### 1.1.5 Fixing brackets

The fixing brackets are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2. They have the dimensions given in Annex A 3.3 of the ETA.

#### 1.1.6 Connecting devices

Hexagon screws M8x40-A2 according to EN ISO 4017<sup>5</sup> with a washer A2 Ø 8.4 according to EN ISO 7089<sup>6</sup> are used as clamp screws in the fixing bracket (see Annex A.2.3 and A.2.4). The screwing depth is 20 mm.

For the connection between the bearing profile and the base profile 2 (see Annex A 2.4), 2 self-drilling screws (screw spacing 30 mm) with hexagon head M8x40-A2 according to EN ISO 15480<sup>7</sup> made of stainless steel material no. 1.4016 according to EN 10088-2<sup>8</sup>. are used per side and bearing profile.

For fixing the support profile to the base profile 2, two self-drilling screws (screw distance 30 mm) with hexagon head A2 4.8x32 according to DIN EN ISO 15480 made of stainless steel material no. 1.4016 according to EN 10088-2 are used per side and support profile (see Annex A.2.4).

Stainless steel rivets A2 Ø 4.8x12 according to EN ISO 15976<sup>9</sup> are used to connect the aluminium flat profile to the covering profile. Two rivets are placed at each end and at the overlaps of the flat profiles. If the profile continues above a cover profile, only one rivet is set centrally (see appendix A.2.1 and A.2.2).

The aluminium angle is fixed between the bearing profiles with two screws with sealing washer 4.8x13 according to DIN EN ISO 15480 as per Annex A.2.3 to A.2.5.

4	EN 755-2:2016	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties
5	EN ISO 4017:2015-05	Fasteners - Hexagon head screws - Product grades A and B (ISO 4017:2014)
6	EN ISO 7089:2000-11	Plain washers - Normal series, Product grade A (ISO 7089:2000)
7	EN ISO 15480:2019	Fasteners - Hexagon washer head drilling screws with tapping screw thread
8	EN 10088-2 :2014	Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
9	EN ISO 15976:2003-04	Closed end blind rivets with break pull mandrel and protruding head - St/St (ISO 15976:2002)

### 1.1.7 Optional aluminium profiles

#### 1.1.7.1 Aluminum flat profile 30 mm x 3 mm

In case the class SB 1200 (BWR 4) is to be achieved, aluminum flat profiles made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2 according to Annex A 1.1 are to be fastened to the covering profile with 2 stainless steel rivets 4.8 x 12 in accordance with EN ISO 15976<sup>10</sup> according to Annex 2.1. They have the dimensions given in Annex A 3.2 of the ETA.

#### 1.1.7.2 Aluminum angle 30 x 28.9 mm x 2 mm

In case the GF-UP-sheet in accordance with section 1.1.8 is used an aluminum angle 30 x 28.9 mm x 2 mm made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2 is to be fastened to the base profile 2 with a pair of screws with sealing washers Ø 4.8 x 13 between the bearing profiles according to Annex A 2.2- A 2.4.

### 1.1.8 Optional (full-surface) covering: GF-UP-sheet

A sheet made from glass fibre-reinforced unsaturated polyester resin with a thickness of 1.1 mm and with a glass content of at least 24% by mass may be arranged under the multi-wall sheets. It corresponds to the specifications deposited with Deutsches Institut für Bautechnik.

### 1.1.9 'ATTRIA Bogenlichtband BLB' roof kit

The roof kit is made up of the components described in Sections 1.1.1 to 1.1.6. The components according to section 1.1.7 and 1.1.8 may be used in addition

It can be used as a single-span system (maximal distance of axles: 1072 mm). For a double-span system (maximal distance of axles: 536 mm) and a triple-span system (maximal distance of axles: 357 mm) additional support profiles are arranged as intermediate supports.

Table 2: 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
GF-UP-sheet	Class E as per EN 13501-1 <sup>11</sup>
Bearing, covering and support profiles	Class A1 as per EN 13501-1 (in accordance with EC Decision 96/603/EC (as amended) without the need for further testing)
Base (Impost) profiles	
Optional aluminium profiles	
Glazing beads and fixing brackets	
Connecting devices	

## 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 and C.

<sup>10</sup> EN ISO 15976:2002 Closed end blind rivets with break pull mandrel and protruding head - St/St (ISO 15976:2002)

<sup>11</sup> EN 13501-1:2010 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests

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 with GF-UP-sheet as underlying inner layer/ roof slope < 20° support angle $\alpha \leq 45^\circ$ (in accordance with annex 1)	Broof (t1) in accordance with EN 13501-5 <sup>12</sup>
Fire performance in case of external fire exposure without GF-UP-sheet as underlying inner layer	No performance assessed
Reaction to fire	Class E in accordance with EN 13501-1
Resistance to fire	No performance assessed

#### 3.2 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Watertightness	Category 1 (no leaks with no differential air pressure) up to inclination of the substructure from the horizontal: 5°

#### 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/m <sup>2</sup> ]	See Annex B 2
Characteristic load bearing capacity of the fasteners	See Annex B 3
Consideration of the effect of load duration	See Annex B 1.2
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 (50 kg)/ in case of using components in accordance with to 1.1.7.1	SB 0 (no requirement)/ SB 1200
Resistance to impact loads from a hard object (250 g)	Passed (DoP in accordance with EN 16153)

#### 3.4 Protection against noise (BWR 5)

No performance assessed

<sup>12</sup>

EN 13501-5:2016

Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests

### 3.5 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance	No performance assessed
Air permeability	No performance assessed
Radiation Properties * – Light transmittance – Total solar energy transmittance	See declaration of performance according to EN 16153 Design details as per information deposited with DIBt

\* Note: Depending on the environmental conditions (rapid change of temperature, humidity) condensate in the form of fine droplets can form in the hollow chambers of the multi-wall sheets. The droplets scatter the light and make the fogged areas appear white. Hereby the light transmission reduces; all other properties of the covering are not affected.

### 3.6 Other essential characteristics

Essential characteristic	Performance
Aspects of durability	See Annex A 4

## 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.

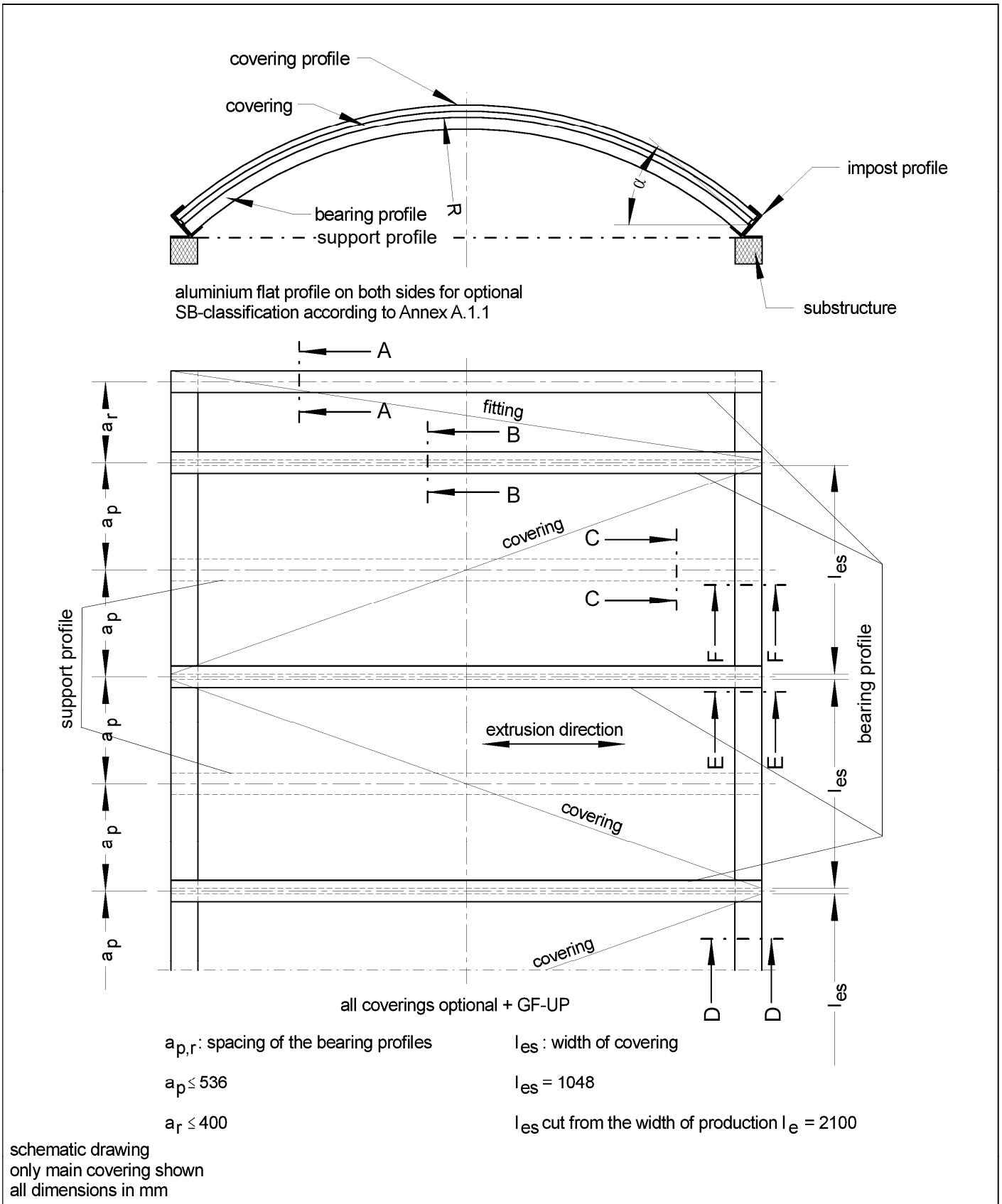
Issued in Berlin on 10 May 2023 by Deutsches Institut für Bautechnik

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

*beglaubigt:*  
Wachner



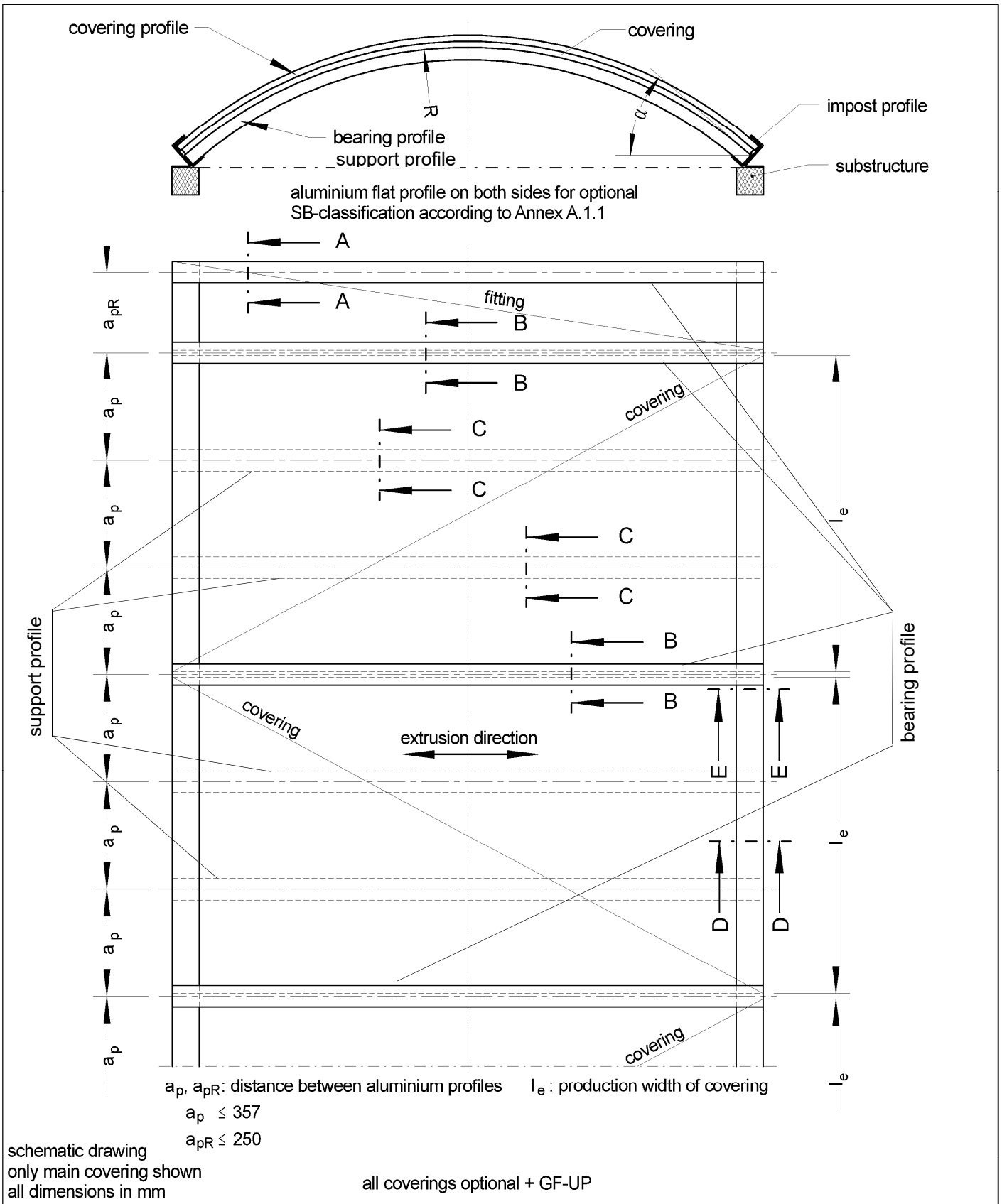




ATTRIA Bogenlichtband BLB

PC 16  
2-span-system, system overview

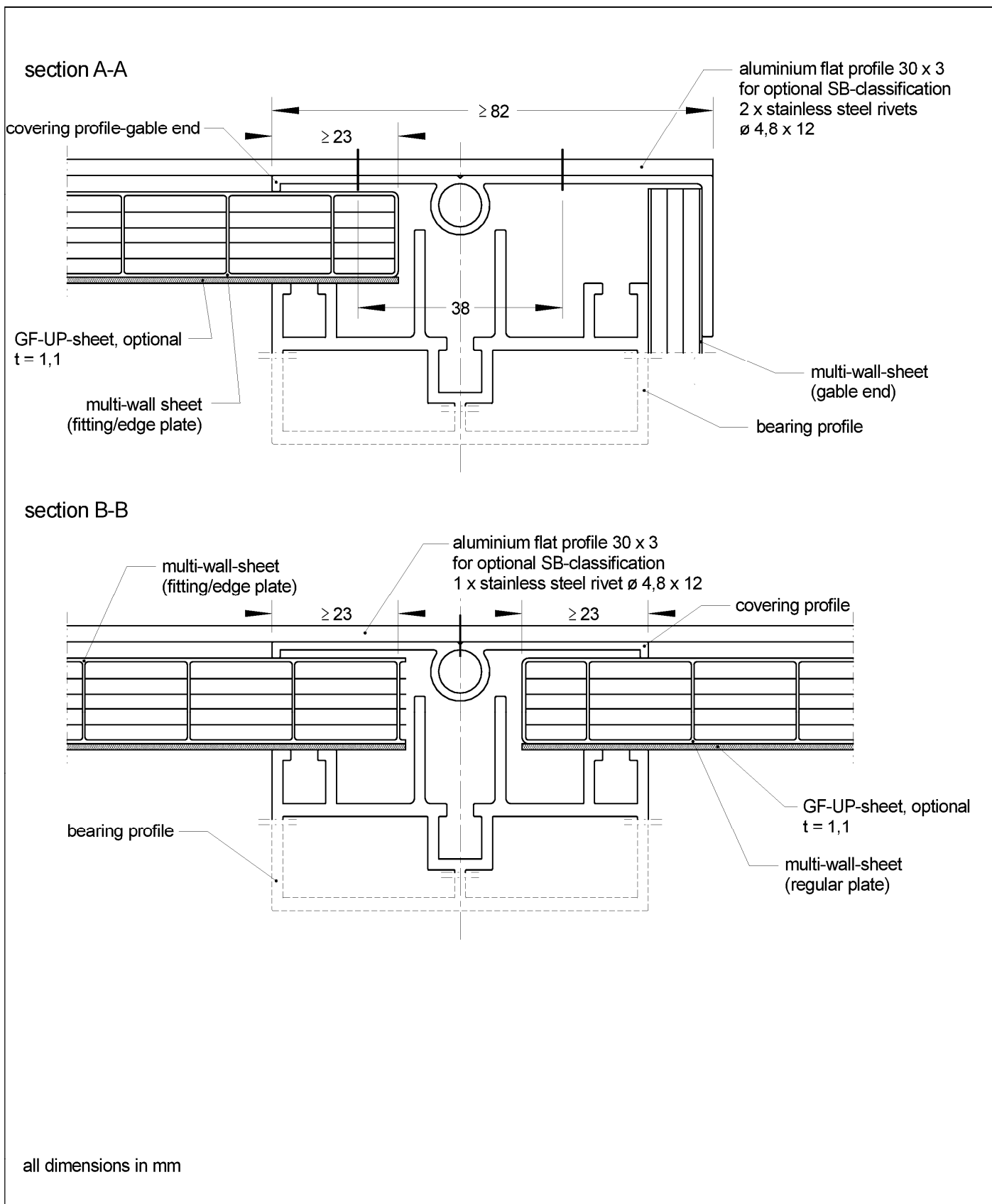
Annex A 1.2



ATTRIA Bogenlichtband BLB

PC 16  
3-span-system, system overview

Annex A 1.3



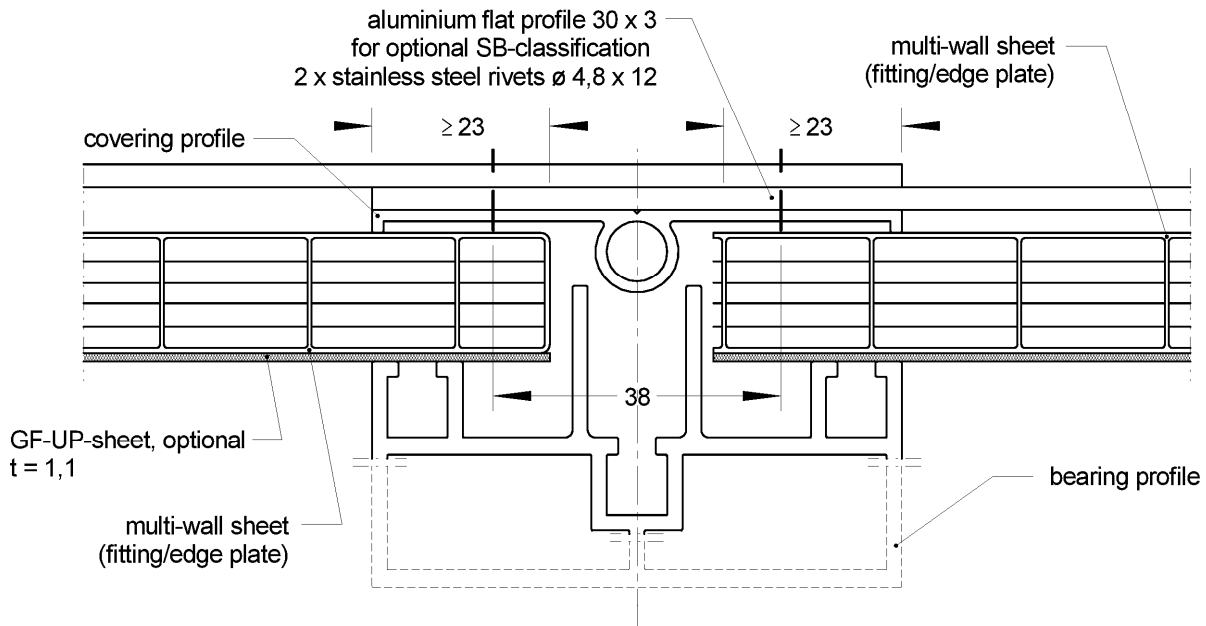
ATTRIA Bogenlichtband BLB

Combinations of arch profiles 1-, 2- and 3-span-system  
Section A-A and B-B

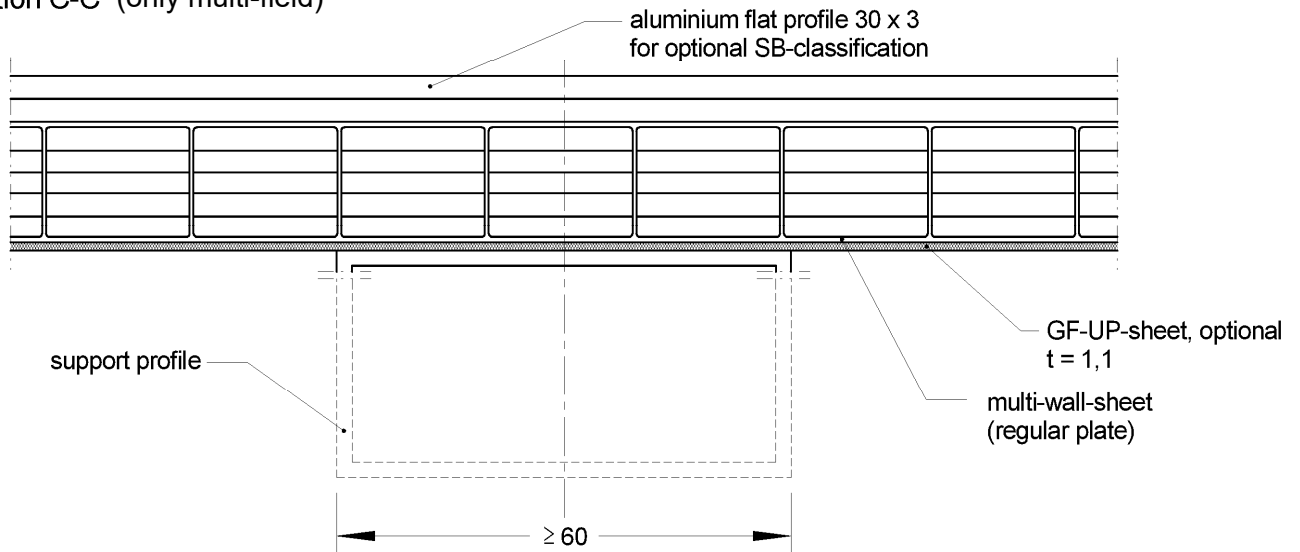
Annex A 2.1

English translation prepared by DIBt

section B-B (overlap joint of the aluminium flat profile)



section C-C (only multi-field)

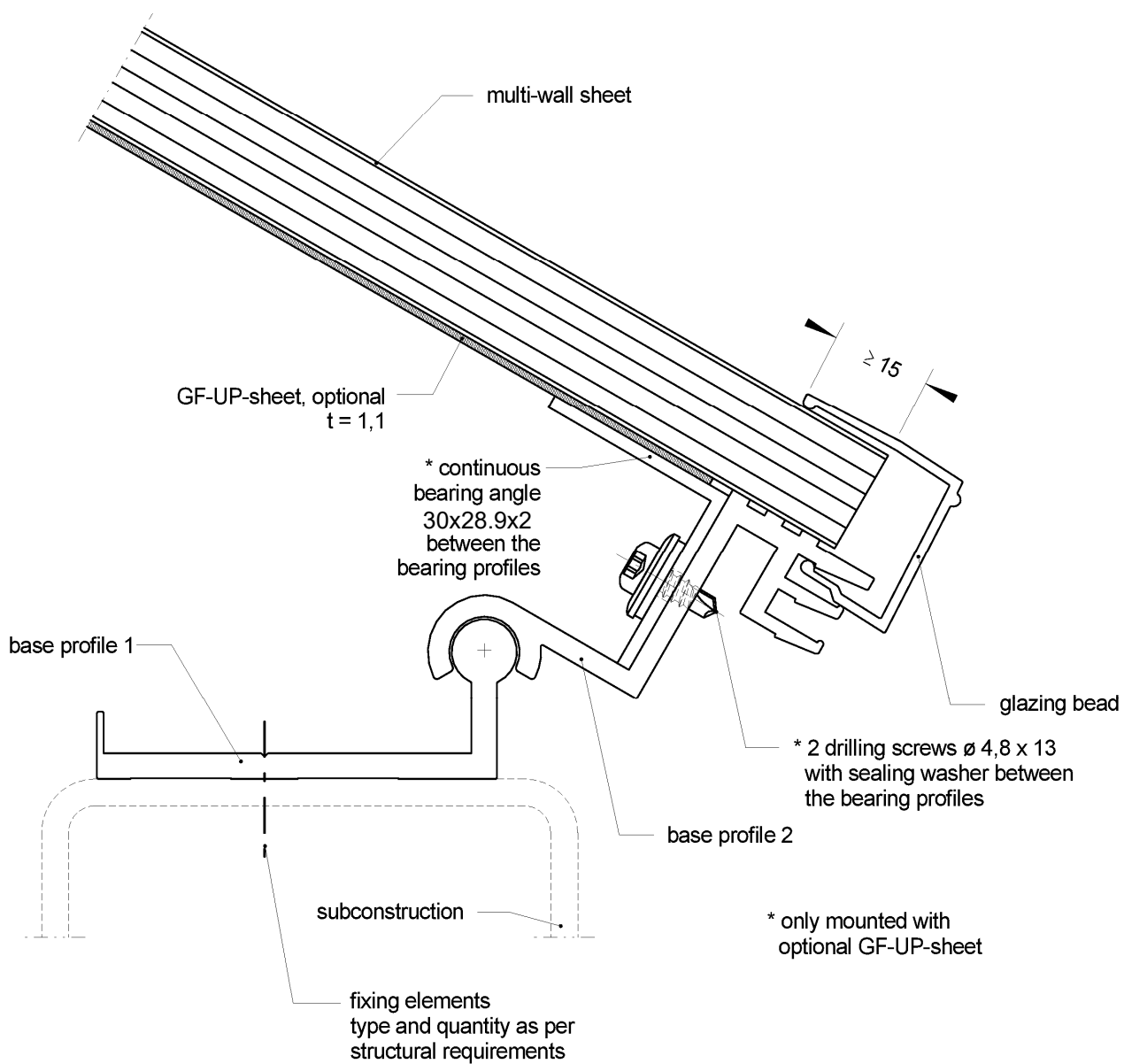


all dimensions in mm

ATTRIA Bogenlichtband BLB

Combinations of arch profiles 1-, 2- and 3-span-system  
 section B-B (overlap); Section C-C: applies to 2- and 3- span-system only

Annex A 2.2

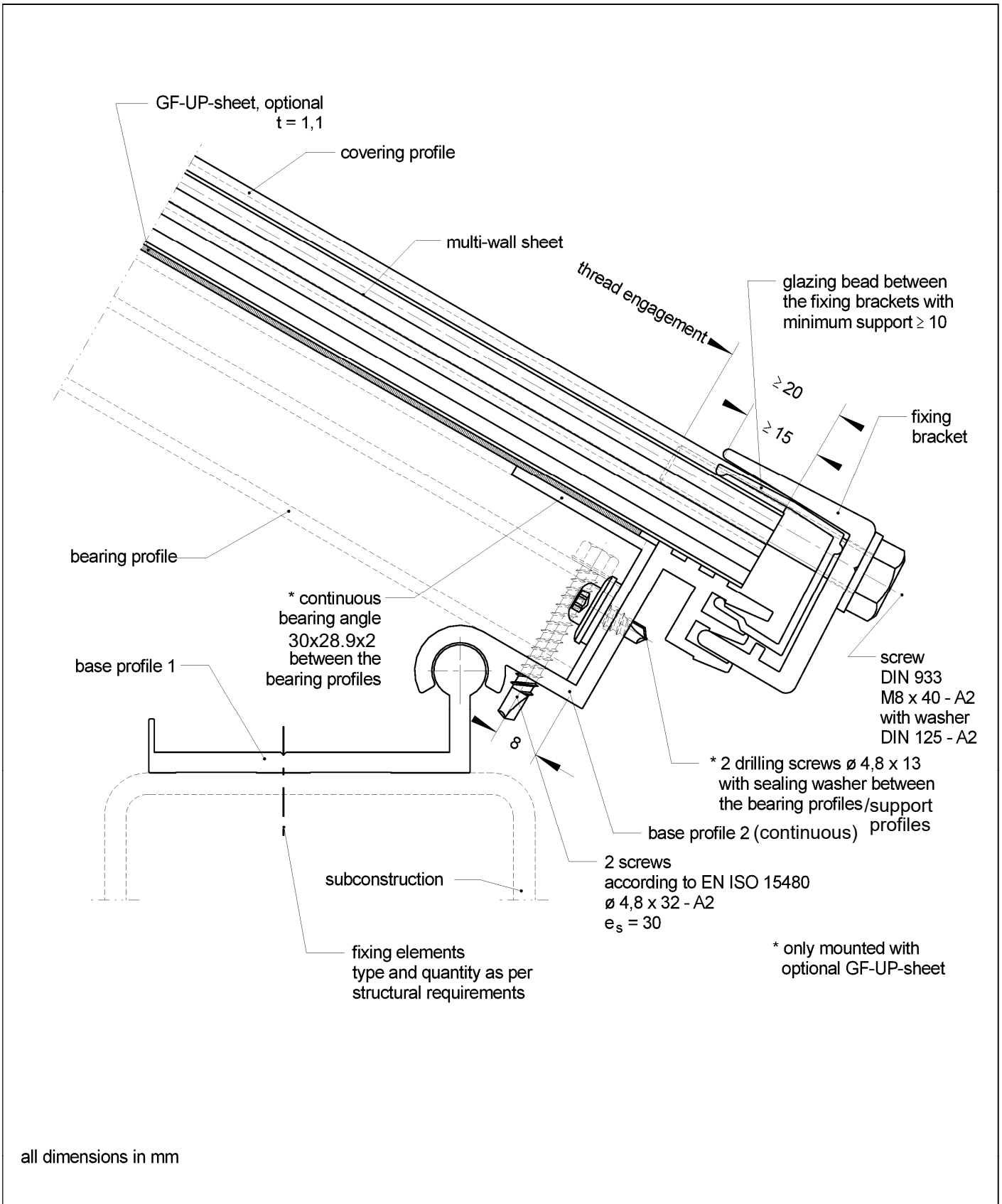


all dimensions in mm

ATTRIA Bogenlichtband BLB

Impost  
Section D-D

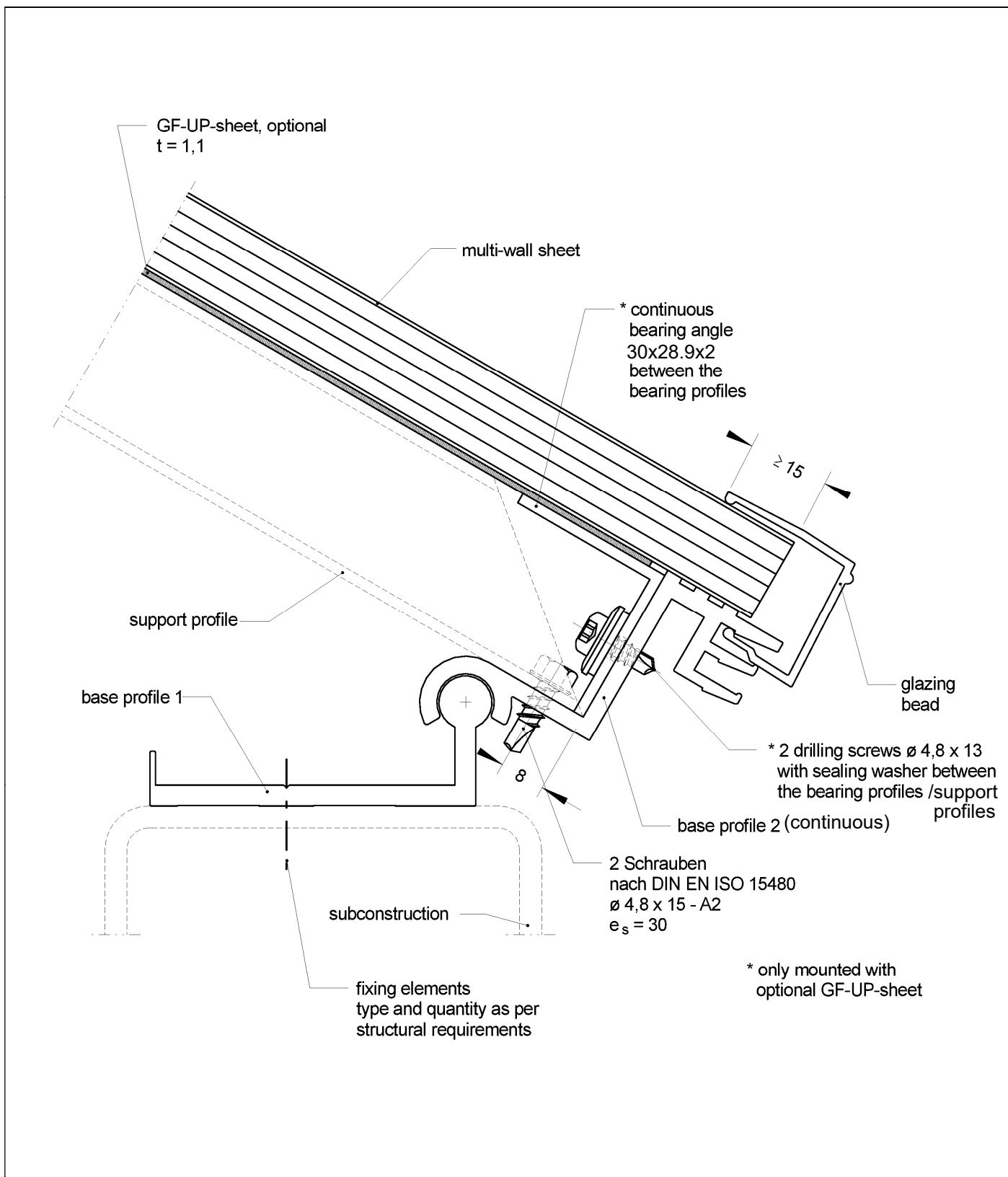
Annex A 2.3



ATTRIA Bogenlichtband BLB

Impost  
Section E-E

Annex A 2.4



ATTRIA Bogenlichtband BLB

Impost  
Section F-F

Annex A 2.5

<p><b>covering profile</b></p>		<p>EN AW-6060, condition T66 according to DIN EN 755-2</p>
<p><b>covering profile-gable end</b></p>		<p>EN AW-6060, condition T66 according to DIN EN 755-2</p>
<p><b>bearing profile</b></p>		<p>EN AW-6060, condition T66 according to DIN EN 755-2</p>
<p><b>support profile</b></p>		<p>EN AW-6060, condition T66 according to DIN EN 755-2</p>
<p>dimensions without tolerances: tolerances as per EN 755-9 all dimensions in mm</p>		

ATTRIA Bogenlichtband BLB

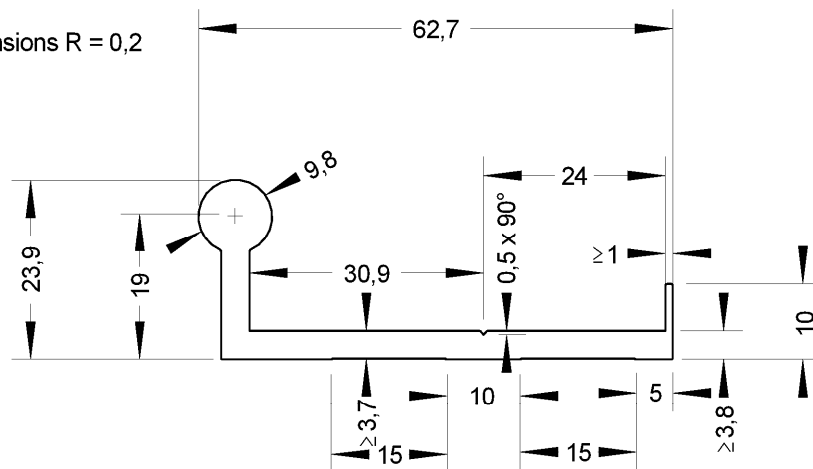
Covering profile, bearing profile and support profile  
Sections

Annex A 3.1



base profile 1

radii without dimensions  $R = 0,2$

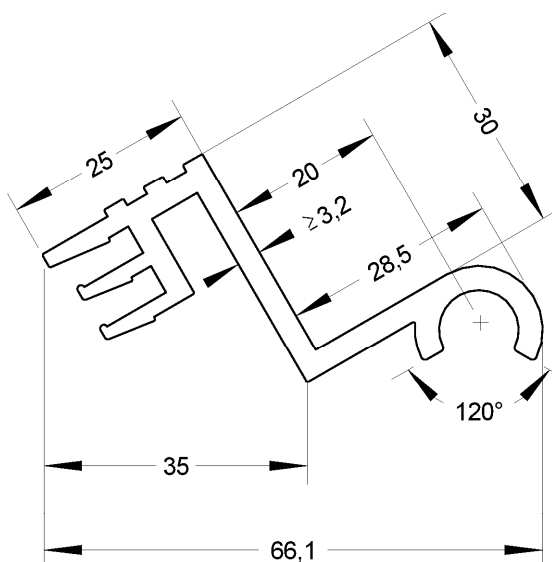


EN AW-6060,  
condition T66  
as per DIN EN 755-2

base profile 2

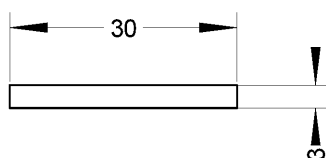
wall thicknesses without dimensions  $\geq 2,0$

radii without dimensions  $R = 0,2$



EN AW-6060,  
condition T66  
as per DIN EN 755-2

aluminium flat profile



EN AW-6060,  
condition T66  
as per DIN EN 755-2

dimensions without tolerances:  
tolerances as per EN 755-9

all dimensions in mm

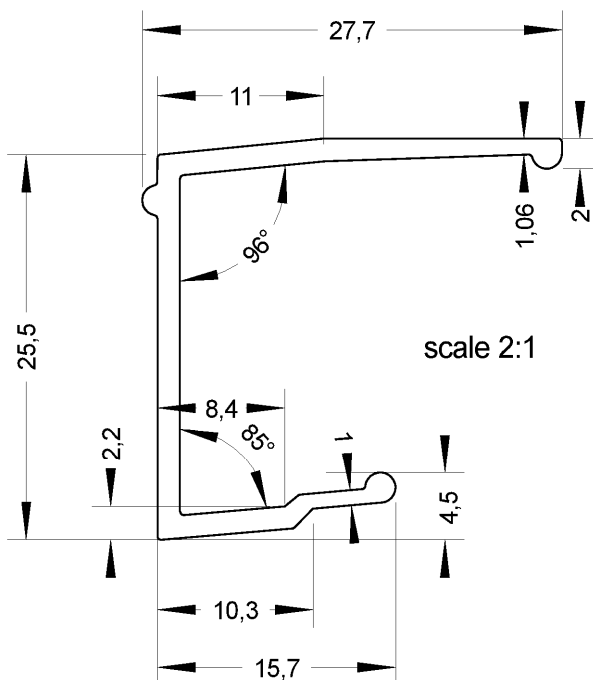
ATTRIA Bogenlichtband BLB

Base profile 1, base profile 2 and optional aluminium flat profile  
Sections

Annex A 3.2

**glazing bead**

wall thicknesses without  
dimensions  $\geq 1,5$   
radii without dimensions  $R = 0,5$

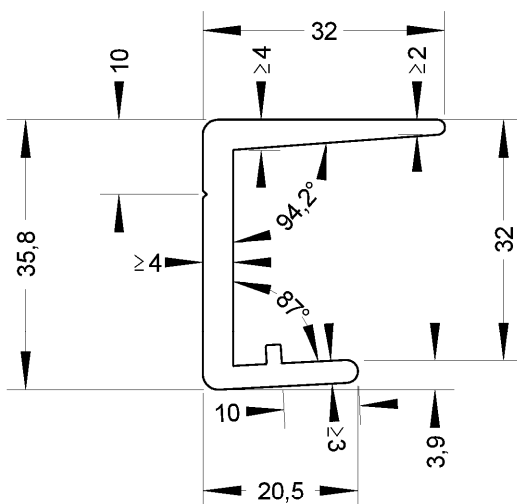


EN AW-6060,  
condition T66  
as per DIN EN 755-2

**fixing bracket**

wall thicknesses without  
dimensions  $\geq 2,0$   
radii without dimensions  $R = 0,2$

length  $l = 94$



EN AW-6060,  
condition T66  
as per DIN EN 755-2

dimensions without tolerances:  
tolerances as per EN 755-9  
all dimensions in mm

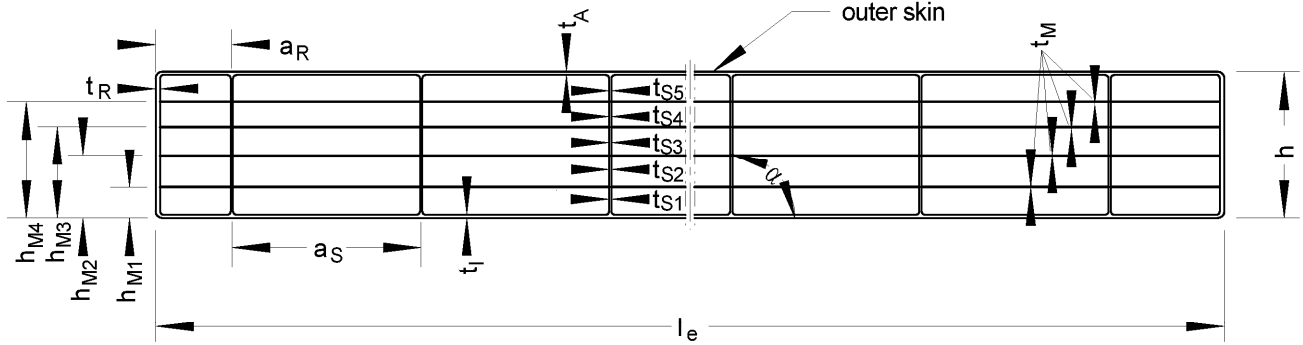
ATTRIA Bogenlichtband BLB

Glazing bead and fixing bracket  
Sections

Annex A 3.3

English translation prepared by DIBt

Sheet: Policarb 16 mm 6W  
Manufacturer: dott.gallina s.r.l., La Loggia  
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	$a_S$ mm	$a_R$ mm	$t_A$ mm	$t_I$ mm
2100	15,9	3,6	6,5	9,5	12,2	19,5	14,0	0,80	0,75
+6 -2	$\pm 0,5$	+0,4 -0,3	+0,3 -0,35	+0,35 -0,4	+0,45 -0,65	+0,5	+1,4	-0,07	-0,07

$t_{S1}$ mm	$t_{S2}$ mm	$t_{S3}$ mm	$t_{S4}$ mm	$t_{S5}$ mm	$t_M$ mm	$t_R$ mm	weight per area kg/m <sup>2</sup>	difference $ \Delta\alpha $ to 90°
0,52	0,40	0,38	0,51	0,64	0,09	0,67	2,86	
-0,08	-0,07	-0,08	-0,11	-0,12	-0,02	-0,16	+0,24 -0,17	$\leq 5^\circ$

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

mechanical resistance (deformation behavior)				
$B_x$	$B_y$	$S_y$	$M_{b,pos}$	$M_{b,neg}$
191,0 Nm <sup>2</sup> /m	43,7 Nm <sup>2</sup> /m	2683 N/m	84,0 Nm/m	80,3 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 strenght
10 ( $\Delta A$ )	5 % ( $\Delta A$ )	Cu 1	Ku 1

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

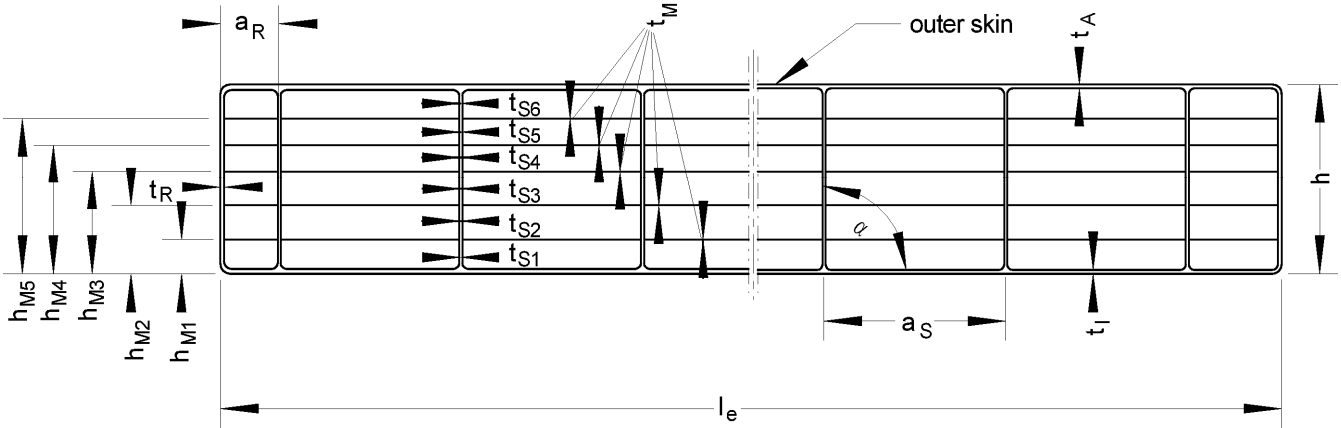
ATTRIA Bogenlichtband BLB

Cross section geometry, weight per area, mechanical performance requirements  
Minimum performance levels or classes in accordance with EN 16153  
of the "Polcarb 16 mm 6W"

Annex A 4.1

English translation prepared by DIBt

Sheet: Polcarb 16 mm 7W  
Manufacturer: dott.gallina s.r.l., La Loggia  
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	2,7	5,5	8,0	10,7	13,4	13,8	10,8	0,63	0,61
+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	-0,04	-0,03

$t_{S1}$ 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/m <sup>2</sup>	difference $ \Delta\alpha $ to 90°
0,39	0,41	0,34	0,29	0,30	0,36	0,09	0,46	2,64	
-0,06	-0,05	-0,03	-0,04	-0,03	-0,05	-0,01	-0,11	+0,09 -0,17	$\leq 9^\circ$

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

mechanical resistance (deformation behavior)				
$B_x$	$B_y$	$S_y$	$M_{b,pos}$	$M_{b,neg}$
169,9 Nm <sup>2</sup> /m	48,4 Nm <sup>2</sup> /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 ( $\Delta A$ )	5 % ( $\Delta A$ )	Cu 1	Ku 1

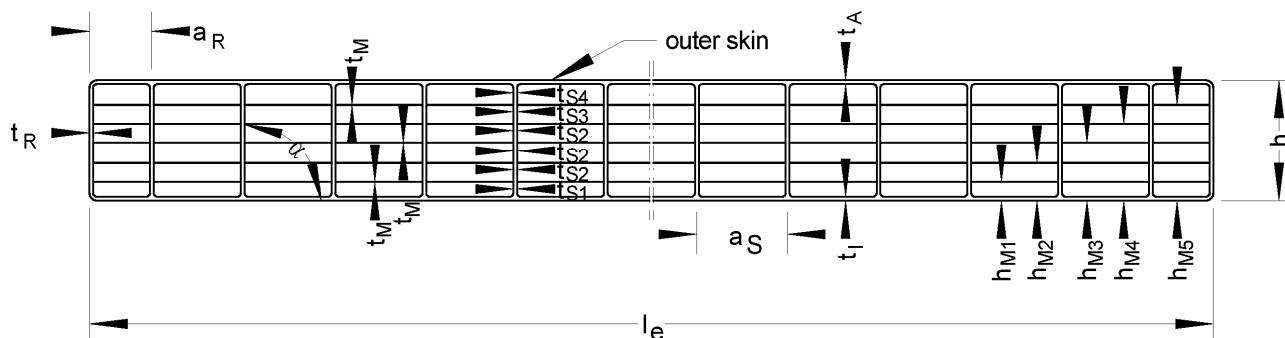
Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

ATTRIA Bogenlichtband BLB

Cross section geometry, weight per area, mechanical performance requirements  
Minimum performance levels or classes in accordance with EN 16153  
of the "Polcarb 16 mm 7W"

Annex A 4.2

Sheet: **Akyver Sun Type 16/7w-12 2600**  
 Manufacturer: **CORPLEX, Kaysersberg**  
 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	16,0	2,4	4,9	7,7	10,4	12,9	12,0	6,5	0,56	0,52
+6 -2	$\pm 0,5$	+ 0,5 - 0,25	+ 0,45 - 0,4	+ 0,4 - 0,55	+ 0,25 - 0,3	+ 0,3 - 0,3	+ 0,40	+ 2,5	- 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/m <sup>2</sup>	difference $ \Delta\alpha $ to 90°
0,41	0,39	0,44	0,44	0,06	0,58	2,56	to 90°
- 0,10	- 0,12	- 0,09	- 0,10	- 0,02	- 0,27	+ 0,15 - 0,09	$\leq 4^\circ$

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

mechanical resistance (deformation behavior)				
$B_x$	$B_y$	$S_y$	$M_{b,pos}$	$M_{b,neg}$
176,5 Nm <sup>2</sup> /m	58,8 Nm <sup>2</sup> /m	2703 N/m	68,8 Nm/m	59,1 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 strenght
10 ( $\Delta A$ )	5 % ( $\Delta A$ )	Cu 1	Ku 1

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

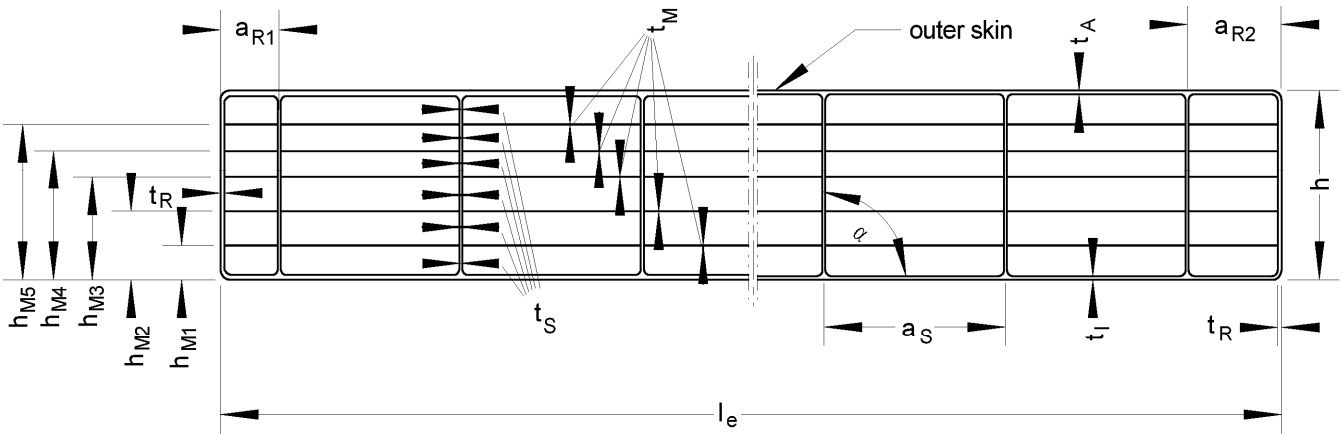
ATTRIA Bogenlichtband BLB

Cross section geometry, weight per area, mechanical performance requirements  
 Minimum performance levels or classes in accordance with EN 16153  
 of the "Akyver Sun Type 16/7w-12 2600"

Annex A 4.3

English translation prepared by DIBt

Sheet: Exolon multi UV 7/16-14  
Manufacturer: Exolon Group, 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
2100	16,0	3,2	5,7	8,2	10,7	13,2	13,9	7,4	9,6
+6 -2	$\pm 0,5$	+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

$t_A$ mm	$t_I$ mm	$t_S$ mm	$t_M$ mm	$t_R$ mm	weight per area kg/m <sup>2</sup>	difference $ \Delta\alpha $ to 90°
0,59	0,61	0,39	0,08	0,67	2,63	
-0,07	-0,10	-0,14	-0,02	-0,30	+0,13 -0,05	$\leq 8^\circ$

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

mechanical resistance (deformation behavior)				
$B_x$	$B_y$	$S_y$	$M_{b,pos}$	$M_{b,neg}$
176,9 Nm <sup>2</sup> /m	45,7 Nm <sup>2</sup> /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 strenght
10 ( $\Delta A$ )	5 % ( $\Delta A$ )	Cu 1	Ku 1

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

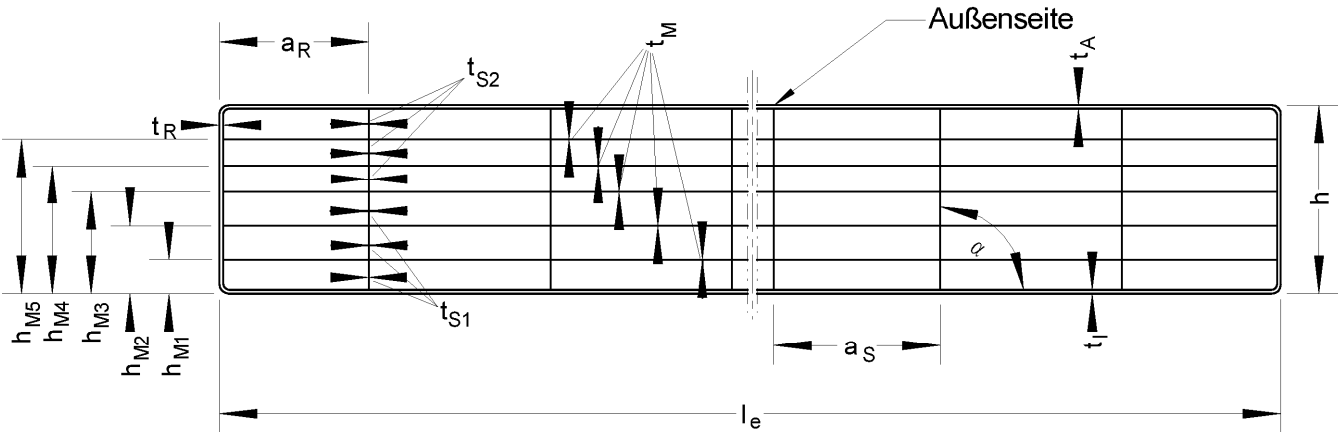
ATTRIA Bogenlichtband BLB

Cross section geometry, weight per area, mechanical performance requirements  
Minimum performance levels or classes in accordance with EN 16153  
of the "Exolon multi UV 7/16-14"

Annex A 4.4

English translation prepared by DIBt

Sheet: **Macrolux Multiwall LL 7W - 16 mm - 2,6 kg/m<sup>2</sup>**  
 Manufacturer: **Stabilit Suisse S.A., Stabio**  
 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	$\pm 0,5$	+ 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/m <sup>2</sup>	difference $ \Delta\alpha $ 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	$\leq 9^\circ$

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

mechanical resistance (deformation behavior)				
$B_x$	$B_y$	$S_y$	$M_{b,pos}$	$M_{b,neg}$
170,3 Nm <sup>2</sup> /m	36,0 Nm <sup>2</sup> /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 ( $\Delta A$ )	5 % ( $\Delta A$ )	Cu 1	Ku 1

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

ATTRIA Bogenlichtband BLB

Cross section geometry, weight per area, mechanical performance requirements  
 Minimum performance levels or classes in accordance with EN 16153  
 of the "Macrolux Multiwall LL 7W - 16 mm - 2,6 kg/m<sup>2</sup>"

Annex A 4.5

## ATTRIA Bogenlichtband BLB

## 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 and B 2. 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  $\psi$  coefficient defined in EN 1990<sup>1</sup> may be applied. In design situations where the wind is applied as the dominant variable action, the  $\psi$  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 support angle  $\alpha \leq 45^\circ$  (see annex 1) in roofs with a slope  $\leq 20^\circ$  the negative wind pressure loads (wind suction loads) may be applied in simplified form as acting on the translucent 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<sup>2</sup>.

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  $> 10^\circ$  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  $\gamma_M$ , the factor taking into account the effects of media  $C_u$  and the temperature factor  $C_\theta$  as follows:

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

The following factors shall be applied:

Factor taking into account the effects of media and ageing $C_u$	1.10	
Temperature factor $C_\theta$	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 $\gamma_{MR}$	Material safety factor $\gamma_{MC}$
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  $\psi$  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 table in Annex B 2 for the given multi-wall sheets and direction of loading.

<sup>1</sup> EN 1990:2010-12 Eurocode: Basis of structural design; German version EN 1990 A1:2005 + A1:2005/AC:2010  
<sup>2</sup> EN 1991-1-4:2010-12 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions

## B 2 Characteristic structural resistances

### Covering "PC 16" – Annexes A 4.1 – A 4.5

Multi-wall sheet in accordance with Annex	Radius $R \geq 2,40\text{m}$ R [m]	System	$a_p$ [m]	Characteristic values of structural resistance [kN/m <sup>2</sup> ]			
				downward load		uplift load	
				$R_k$	$C_k$	$R_k$	$C_k$
A 4.1 Policarb 16mm 6W 2800	$\leq 2,70$	1-span	1,07	2,43	2,43	2,10	2,10
		2-span	0,53	8,31	8,31		
		3-span	0,36	8,31	8,31		
A 4.2 Policarb 16mm 7W 2600	$\leq 2,70$	1-span	1,07	1,93	1,93	1,86	1,86
		2-span	0,53	8,60	8,60		
		3-span	0,36	8,60	8,60		
A 4.3 Akyver Sun Type 16/7W-12 2600	$\leq 2,70$	1-span	1,07	2,04	2,04	2,10	2,10
		2-span	0,53	8,16	8,16		
		3-span	0,36	8,16	8,16		
A 4.4 Exolon multi UV 7/16-14	$\leq 2,70$	1-span	1,07	1,90	1,90	1,98	1,98
		2-span	0,53	7,62	7,62		
		3-span	0,36	7,62	7,62		
A 4.5 Macrolux Multiwall LL 7W-16-2,6 kg/m <sup>2</sup>	$\leq 2,70$	1-span	1,07	2,02	2,02	1,89	1,89
		2-span	0,53	8,80	8,80		
		3-span	0,36	8,80	8,80		

## B 3 Load-bearing capacity and characteristic values for structural resistance of the fasteners

For the connection covering profile with base profile 2 by means of fixing bracket (see Annex A 2.4) the characteristic value apply for the tensile load-bearing capacity  $N_{R,k}$  of the clamp screw at a screwing depth of 20 mm.

Name of screw	Components to be connected	Tensile load-bearing capacity $N_{R,k}$
Hexagon head screw M8x40-A2	covering profile with base profile 2 by means of fixing bracket	9.75 kN

The design value of load-bearing capacity  $N_{R,d}$  can be calculated as follow:

$$N_{R,d} = N_{R,k} / \gamma_M$$

with safety factor:

$$\gamma_M = 1,25 \quad \text{in accordance with DIN EN 1999-1-4:2010}$$

## ATTRIA Bogenlichtband BLB

## Annex C

### Provisions for installation, packaging, transport, storage, use, maintenance and repair

#### C 1 Installation

The fixing of the roof kit on the substructure is not the subject of this ETA. The stability shall be verified for the respective substructure in accordance with the valid European specifications.

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 exhibits a rectangular footprint. The compliance of the existing substructure with the substructure applied during the planning and verification of its load-bearing capacity 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 may not be filled.

If the translucent roof kit can systematically come into contact with chemical substances, the resistance to these substances of the multi-wall sheets in particular shall be checked.

During installation, the multi-wall sheets are placed on the pre-installed bearing profiles and pushed into the glazing bead at the impost. 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 in accordance with Section 1.1.6; the screw shall be screwed at least 20 mm into the screw channel (Annex A 2.4).

The arrangement of additional bearing profiles creates two- or three-span systems for the multi-wall sheets in the transverse direction with a maximum support spacing  $a_p$  in accordance with Annex A 1. Fittings may be installed as single-span systems without additional support arches: up to 250 mm wide in the three-span system and up to 400 mm wide in the two-span system.

The multiwall sheets are joined at the longitudinal edges over a bearing profile; the support width must be at least 23 mm here, as well as in the edge profile (Annex A 2.1 and A 2.2).

The maximum sheet width is ca. 1500 mm. At the impost the multi-wall sheets shall be kept adjustable at least 15 mm in accordance with the specifications in Appendices A 2.3-A 2.5.

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 1.1 mm GRP sheet is installed as required, the multi-wall sheets must be fully covered (including support area).

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

## **C 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.

## **C 3 Use, maintenance, repair**

The roof kit in installed condition is not a walk-on system. For installation purposes, the roof kit may be walked on by a single person using boards laid across the substructure (at least two bearing profiles) for support; the boards shall run perpendicular to the tensioning direction of the bearing profiles.

Within the scope of maintenance, the installed roof kit shall be visually inspected by a qualified expert once a year. The manufacturer shall be consulted if the PC multi-wall sheets exhibit surface cracks or damage or if they are strongly discoloured. The aluminium components of the roof kit shall be examined for pronounced corrosion within the scope of a 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.