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-09/0347 of 10 September 2018

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	CI-System Lichtband B
Product family to which the construction product belongs	Self supporting translucent roof kit
Manufacturer	LAMILUX Heinrich Strunz GmbH Zehstraße 2 95111 Rehau DEUTSCHLAND
Manufacturing plant	
This European Technical Assessment contains	73 pages including 64 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	ETAG 010, used as EAD according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific part

1 Technical description of the product

1.1 Kit description and setup

The "CI-System Lichtband B" roof kit is made up of components which are factory-made and assembled on site as a self-supporting translucent roof kit.

The static system of the roof system "CI-System Lichtband B" complies with the category "Curved roof systems with additional bearing profiles parallel to the span" as listed in section 5.1.1.1.1 a) of the ETAG 010[1].

The roof kit comprises 2.1 m wide arched translucent PC multi-wall sheets which are positioned on curved bearing profiles and clamped against wind loads with covering profiles. The sheets are mounted on the eaves side in a eaves profile consisting of a connecting profile made of PVC and an aluminium profile on the outside. The multi-wall sheets are connected along their longitudinal edges via a bearing profile 60 mm and a covering profile 60 mm. Additional intermediate supports, made of a bearing profile 38 mm and a covering profile 38 mm are arranged parallel to the end arches at equidistant intervals: one for double-span systems (distance of 1.054 m); two for triple-span systems (distance of 0.703 m) or four for five-span systems (distance of 0.422 m).

The self-supporting curved translucent roof system "CI-System Lichtband B" consists of the following components:

- translucent polycarbonate (PC)-multi-wall sheets with thicknesses of 6 mm, 10 mm and 16 mm,
- optionally glass fibre-reinforced unsaturated polyester resin (GRP) sheets "LAMILUXplan 1.2 mm GFUP" with a thickness of 1.2 mm (arranged below the PC multi-wall sheets),
- optionally in case thermal composite configuration (tc16) spacer strips for the air gap,
- arched bearing and covering profiles made of aluminium (width of 60 mm in case of a connection of the covering and ≥ 38 mm for intermediate supports),
- sealings fixed in a shear-resistant manner within the covering profiles 60 mm,
- spacing profiles (mounted on bearing profiles 60 mm when the covering ends),
- on eaves a connecting profile made of PVC-U, a sealing and one of the aluminium-profiles "GL-PC10", "GL-PC16", "GL-PC20", "GL-PC32" or "GL-PC36" depending on the coverings thickness,
- impost consisting of a load converter and of the clamping brackets made of aluminium ("SK-Stoß" or "SK-Stoß 26-36" in case of a connection of the covering and "SK-Feld" or "SK-Feld 26-36" for intermediate supports depending on the coverings thickness),
- fasteners.

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 ETAG 010:2002-09 European Technical Approval Guideline - Self supporting translucent Roof Kits

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.

Table 1: PC-sheets

Manufacturer	Trade name	Sheet height [mm]	Annex
Covestro AG D – Leverkusen	Makrolon multi UV 4/6-6 FEATHER LIGHT	6	A 4.1
	Makrolon multi UV 4/10-6	10	A 4.2
	Makrolon multi UV 6/16-20	16	A 4.3

The multi-wall sheets have unfilled hollow chambers and a UV-protection layer on the outer surfaces which are unmistakably marked. The open ends of the multi-wall sheets shall be sealed for dirt protection with a dust proof masking.

1.1.2 Optional (full-surface) covering supplements

1.1.2.1 GRP sheet "LAMILUXplan 1.2 mm GFUP"

Sheet made from glass fibre-reinforced unsaturated polyester resin with a thickness of 1.2 mm and with a glass content of at least 20 % by mass. It corresponds to the specifications deposited with Deutsches Institut für Bautechnik.

1.1.3 Arched bearing profiles

1.1.3.1 Bearing and covering profiles (38 mm and 60 mm)

The extruded profiles are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 15088[4] and the dimensions are given in Annex A 3.1 of the ETA.

The bearing profiles become bent for the required Radius by the manufacturer.

1.1.3.2 Covering profile sealing

The sealing consists of a supportive structure made of polypropylene (PP) and a sealing lip made of EPDM and has the dimensions given in Annex A 3.11 of the ETA.

The shore A hardness of the supportive structure made of PP shall be 98° +/-5° according to EN ISO 868[5]. The shore A hardness of the sealing lip made of EPDM shall be 60° +/-5° according to EN ISO 868[5].

1.1.4 Eaves profiles

1.1.4.1 Connecting profile "FP24°"

The extruded profiles are made from polyvinylchloride PVC-U, EGL, 078-25-T33 in accordance with EN ISO 1163-1[6] and have the dimensions given in Annex A 3.4.

The connecting profile will be machined by the manufacturer for the required positioning of the other components.

1.1.4.2 Aluminium profiles "GL-PC10", "GL-PC16", "GL-PC20", "GL-PC32" and "GL-PC36"

The extruded profiles are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 15088[4] and the dimensions are given in Annexes A 3.2 to A 3.3 of the ETA.

3	DIN 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; German version EN 16153:2013+A1:201
4	DIN EN 15088:2006-03	Aluminium and aluminium alloys - Structural products for construction works - Technical conditions for inspection and delivery; German version EN 15088:2005
5	DIN EN ISO 868:2003-10	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003); German version EN ISO 868:2003
6	DIN EN ISO 1163-1:1999-10	Plastics - Unplasticized poly(vinyl chloride) (PVC-U) moulding and extrusion materials -Part 1: Designation system and basis for specifications (ISO 1163-1:1995); German version EN ISO 1163-1:1999

1.1.4.3 Eaves sealing

The sealing profile consists of ethylene-propylene terpolymer (EPDM) and the dimensions are given in Annex A 3.11 of the ETA. The shore A-hardness is 60° +/-5° according to EN ISO 868[5].

1.1.5 Spacer

1.1.5.1 Spacer strips 16 x 28 and 16 x 52

The spacer strips consist of a core of PE foam according to EN ISO 7214[7] with an apparent density of 60 kg/m³ which is laminated on the topside and the underside with PE foam according to EN ISO 7214[7] with an apparent density of 24 kg/m³. The dimensions are given in Annex A 3.5 of the ETA.

1.1.5.2 Spacing profiles 10 mm, 16 mm and 20 mm

The extruded spacing profiles consist of polyvinylchloride PVC-U, EGL, 078-25-T33 according to EN ISO 1163-1[6] and the dimensions are given in Annex A 3.4 of the ETA.

1.1.5.3 Spacing profiles TSD-16 and TSD-20

The extruded spacing profiles consist of polyvinylchloride (PVC-U, EGL, 078-25-T33) according to EN ISO 1163-1[6] and the dimensions are given in Annex A 3.5 of the ETA.

1.1.6 Impost

1.1.6.1 Load converter "LK24°-TS35"

The load converter is cast of aluminium alloy EN AC-44200 in accordance with EN 15088[4] and the dimensions are given in Annex A 3.6 of the ETA.

1.1.6.2 Fixing brackets "SK-Stoß", "SK-Stoß 26-36", "SK-Feld" and "SK-Feld 26-36"

The fixing brackets are cast of aluminium alloy EN AC-44200 in accordance with EN 15088[4] and the dimensions are given in Annexs A 3.7 to 3.10 of the ETA.

1.1.7 Fasteners

The following screws have to be used according to the Annex A 3.12 of the ETA:

- self-tapping screw "EJOT JZ3-8.0x38"
  junction between covering profile 38 mm and fixing bracket "SK-Feld", "SK-Feld 26-36"
- self-tapping screw "EJOT JZ3-8.0x64"
  junction between covering profile 60 mm and fixing bracket "SK-Stoß", "SK-Stoß 26-36"
- self-drilling screw "EJOT JT4-6-6.3x30"
  junction between fixing bracket "SK-Feld" or "SK-Feld 26-36" and load converter "LK24°-TS35" and junction between fixing bracket "SK-Stoß" or "SK-Stoß 26-36" and load converter "LK24°-TS35"
- self-drilling screw "EJOT JT4-STS-3-5.5x48"
  junction between bearing profile and load converter "LK24°-TS35"

The screws shall be made of stainless steel material number 1.4301 according to EN 10088-3[8] and they shall comply with the information deposited in the technical documentation of this ETA.

The characteristic load-bearing capacity of screws type "EJOT JZ3-8.0x38", "EJOT JZ3-8.0x64" and "EJOT JT4-6-6.3x30" is listed in section 2.2.1 of the ETA. The self-drilling screw "EJOT JT4-STS-3-5,5x48" is used for the protection of the bearing profile position only.

[7] DIN EN ISO 7214:2012-07 Cellular plastics - Polyethylene - Methods of test (ISO 7214:2012); German version EN ISO 1163-1:1999

[8] DIN EN 10088-3:2014-12 Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes; German version EN 10088-3:2014

1.1.8 "CI-System Lichtband B" roof kit

The roof kit consists of the factory-made components as described in Sections 1.1.1 to 1.1.7. The following configurations are possible:

Type of the covering	Multi-wall sheet(s) configuration as per Annex	Bearing profile as per Annex	Eaves profile as per Annex
PC10	A 4.2	A 2.1.1	A 2.1.2
PC10 + GFUP [(a)]	A 4.2 + GFUP [(a)]	A 2.2.1	A 2.2.2
PC10 + PC6 [(a)]	A 4.2 + A 4.1 [(a)]	A 2.3.1	A 2.3.2
PC16	A 4.3	A 2.4.1	A 2.4.2
PC16 + GFUP [(a)]	A 4.3 + GFUP [(a)]	A 2.5.1	A 2.5.2
PC10 + PC10 [(a)]	A 4.2 + A 4.2 [(a)]	A 2.6.1	A 2.6.2
PC10 + PC10 +GFUP [(a)]	A 4.2 + A 4.2 + GFUP [(a)]	A 2.7.1	A 2.7.2
PC10 + PC6 tc16 [(a,b)]	A 4.2 + 16mm + A 4.2 [(a)]	A 2.8.1	A 2.8.2
PC10 + PC10 tc16 [(a,b)]	A 4.2 + 16mm + A 4.2 [(a)]	A 2.9.1	A 2.9.2

[(a)] For sheet combinations the first value defines the outside sheet exposed to the weathering and the other sheets are inside layer, the optional GRP-sheets are always installed as inner layer of the covering.

[(b)] For thermal composite sheet combinations, the value after "tc" defines the thickness of the air gap between the multi-wall sheets (e. g. tc 16 = 16 mm).

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 plane view.

The roof kit is applicable within a temperature range from -30 °C to +70 °C.

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 B and the roof light is installed according to the manufacturers guidance.

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 and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic structural resistance of the covering to downward loads from snow and wind	See Annex B 2 for downward loads
Characteristic structural resistance of the covering to uplift loads resulting from wind	See Annex B 2 for uplift loads
Characteristic structural resistance of the covering to live loads	0 KN/m² (not walkable)
Characteristic structural resistance of the impost to forces resulting from uplift loads	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	The European harmonised standards shall apply.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire of the components

Components	Performance
PC Multi-wall sheets	Declaration of performance as per EN 16153/ at least class E as per EN 13501-1[9]
GRP sheet "LAMILUXplan 1.2 mm GFUP"	Class E as per EN 13501-1[9]
Connection profile FP24°	
Spacer strips 16 x 28 and 16 x 52	
Spacing profiles 10 mm, 16 mm and 20 mm	
Spacing profiles TSD-16 and TSD-20	
Covering profile sealing	No contribution to fire spread in accordance with EOTA TR 021 (Version June 2005)
Eaves sealing	
Bearing and covering profiles 60 mm and 38 mm	Class A1 as per EN 13501-1 (without further testing as per Commission Decision 96/603/EC, as amended by Commission Decisions 2000/605/EC and 2003/424/EC)
Aluminium profiles "GL-PC10", "GL-PC16", "GL-PC20", "GL-PC32" and "GL-PC36"	
Load converter "LK24°-TS35"	
Fixing brackets "SK-Stoß", "SK-Stoß 26-36", "SK-Feld" and "SK-Feld 26-36"	
Fasteners	

[9] DIN EN 13501-1:2010-01 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007+A1:2009

3.2.2 Safety in case of fire of the roof system

Essential characteristic	Performance
Fire performance in case of external fire exposure	No performance assessed in accordance with EN 13501-5[10]
Reaction to fire	Class E in accordance with EN 13501-1[9]
Resistance to fire	No performance assessed in accordance with EN 13501-2[11]

3.3 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: 30° perpendicular to the curve direction
Dampness / Condensation *	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.

3.4 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Resistance to damage by impact of a large soft object (50 kg)	No performance assessed
Resistance to impact loads from a small hard object (250 g)	Passed in accordance with ETAG 010
Resistance to horizontal live loads	No performance assessed

3.5 Protection against noise (BWR 5)

Essential characteristic	Performance
Airborne sound insulation	No performance assessed

[10] DIN EN 13501-5:2016-12 Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roofs tests; German version EN 13501-5:2016

[11] DIN EN 13501-2:2016-12 Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services; German version EN 13501-2:2016

3.6 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	No performance assessed for the PC-sheets (Declaration of performance as per EN 16153)

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

In accordance with the ETAG 010 used as EAD the applicable European legal act is: 98/600/EC
The System to be applied is:

Product	Intended use	Levels or classes (reaction to fire)	Systems
roof kit "CI-System Lichtband B"	For general use in roofs and roof structures	A1 (1), E	3

(1) Products / materials not tested for reaction to fire (e.g. products / materials of class A1 in accordance with Commission Decision 96/603/EC)

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

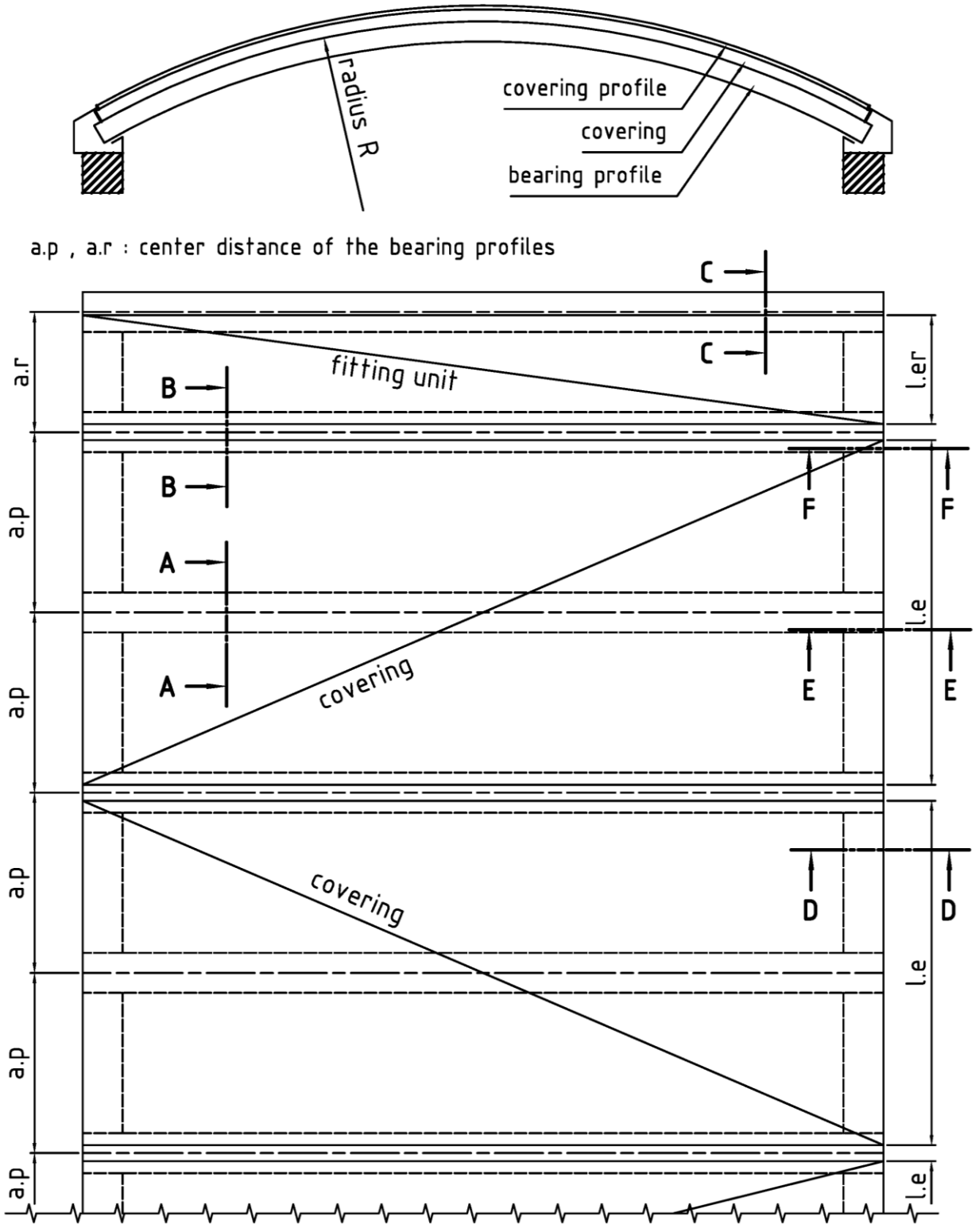
Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 28 September 2018 by Deutsches Institut für Bautechnik

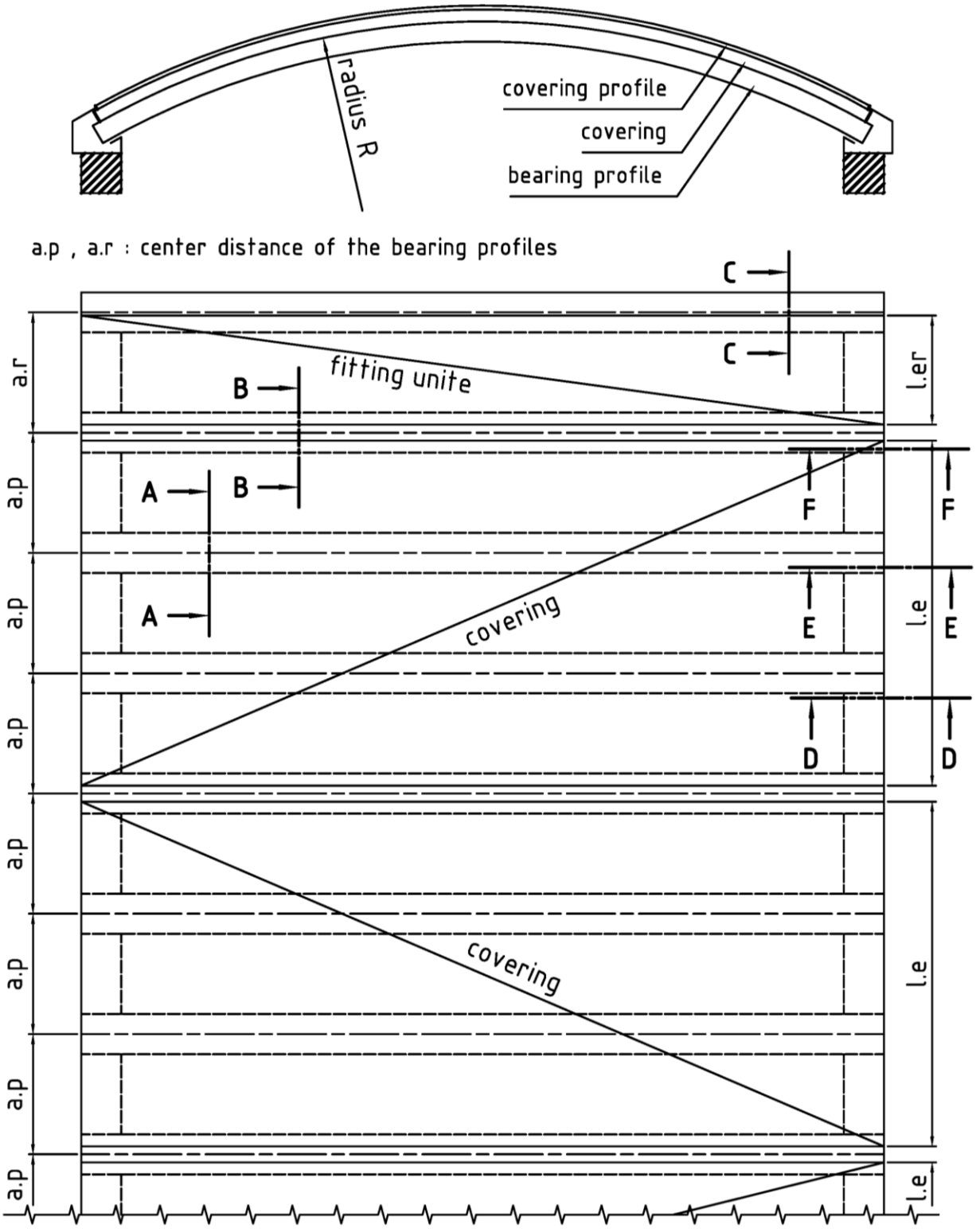
BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Wachner

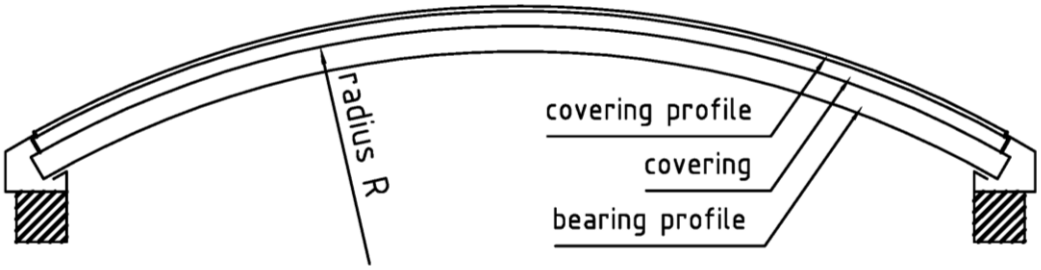
Deutsches Institut für Bautechnik DIBt



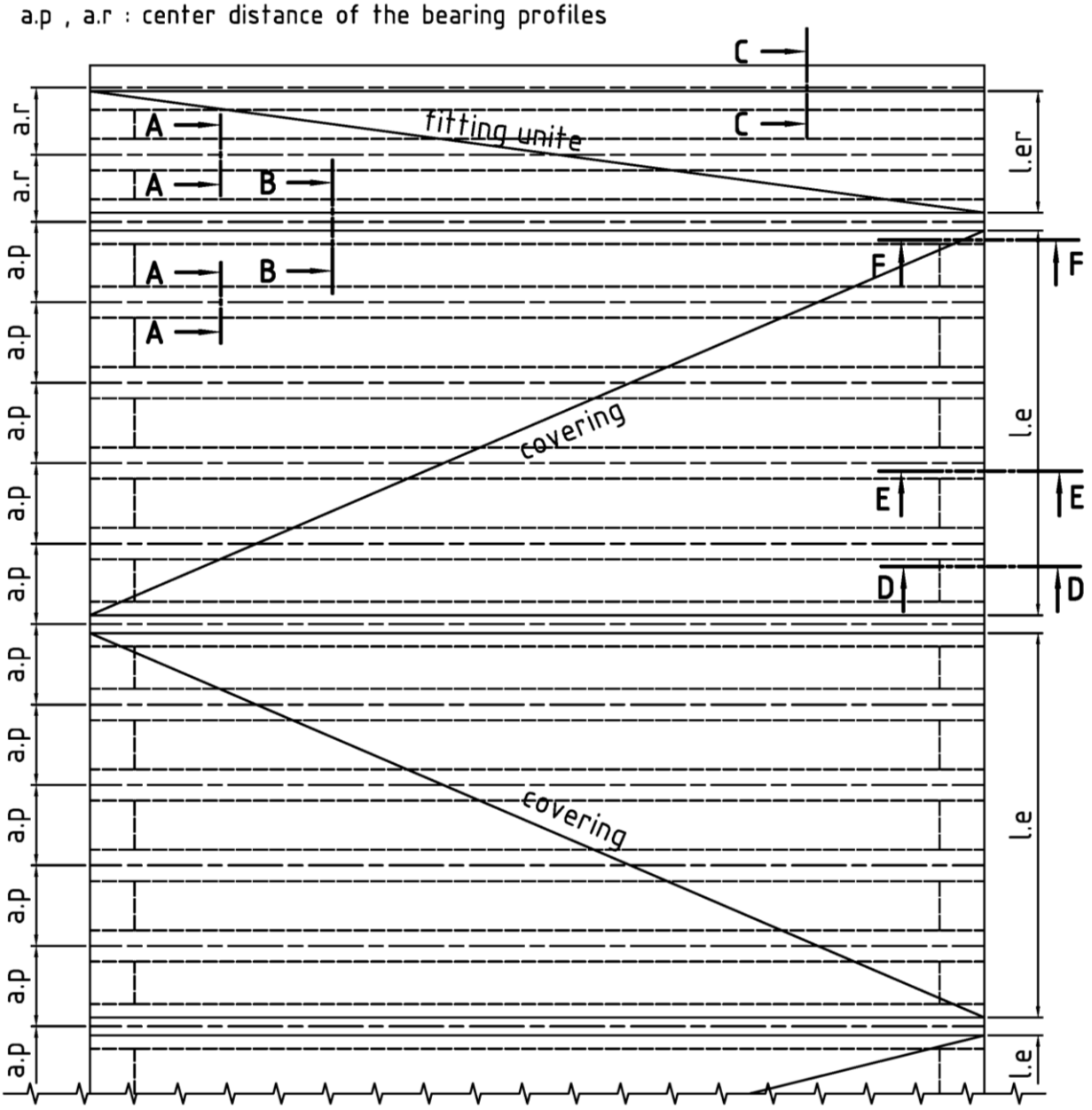
LAMILUX CI-System Lichtband B	Annex A 1.1
System overview 2-span system	



LAMILUX CI-System Lichtband B	Annex A 1.2
System overview 3-span-system	



a.p , a.r : center distance of the bearing profiles



LAMILUX CI-System Lichtband B	Annex A 1.3
System overview 5-span-system	

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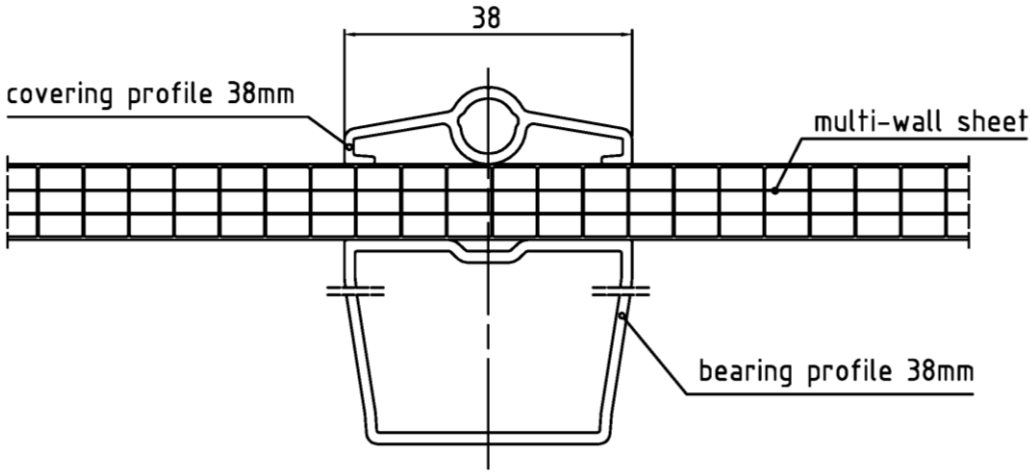
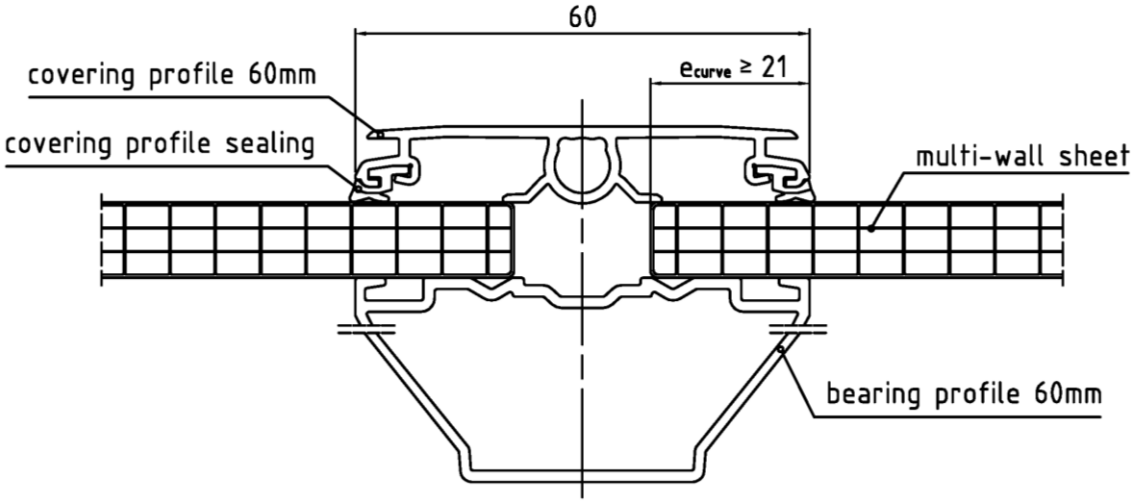
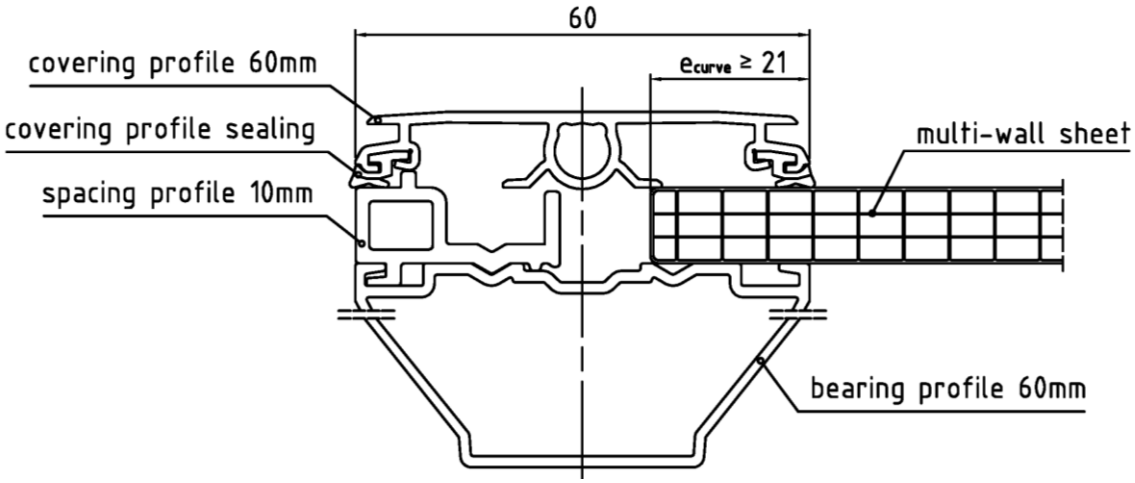
section A-A



section B-B



section C-C



LAMILUX CI-System Lichtband B	Annex A 2.1.1
Sectional views Covering type "PC10" Section A-A; section B-B; section C-C	

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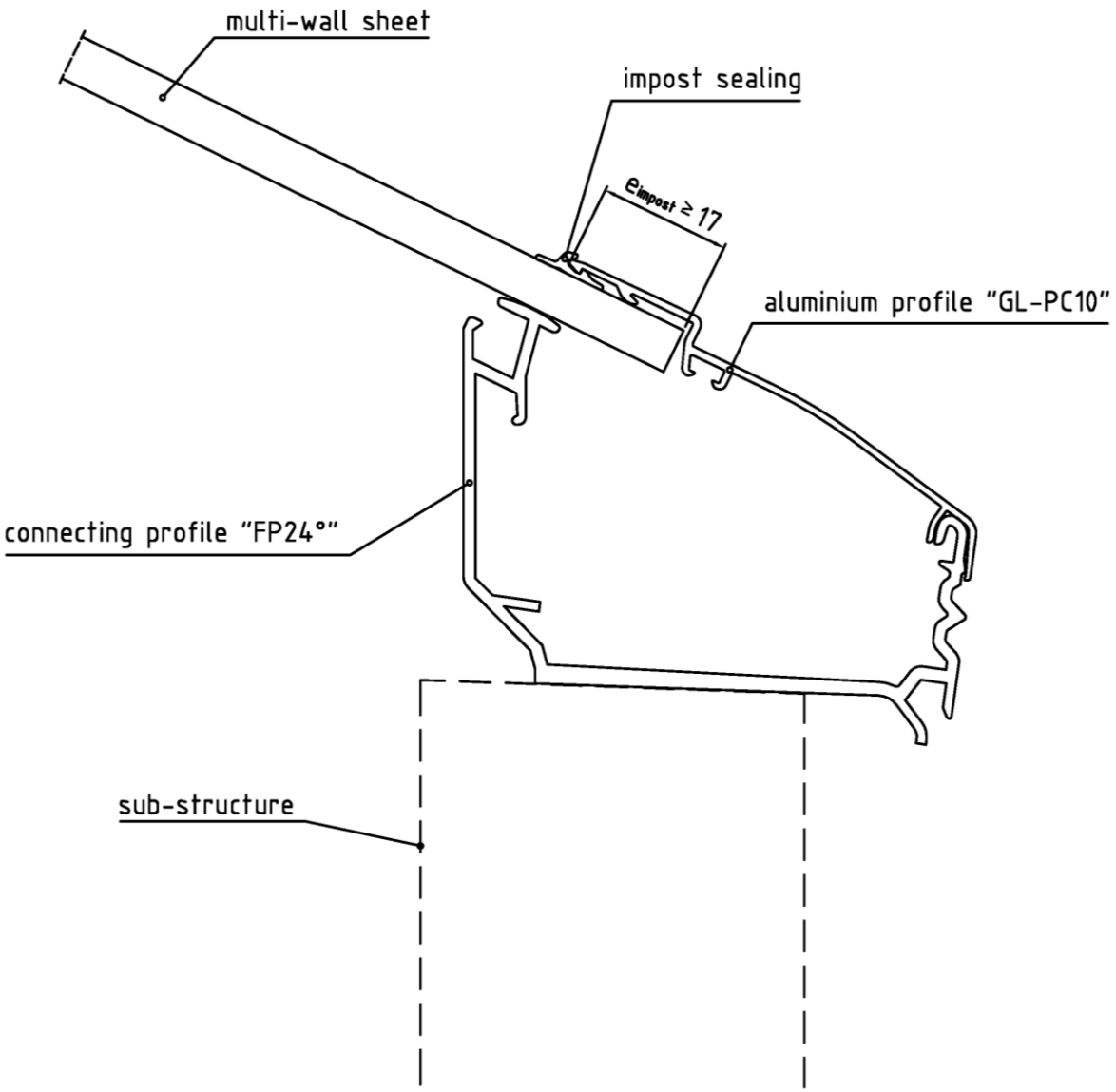
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.1.2
Sectional views Covering type "PC10" Section D-D	

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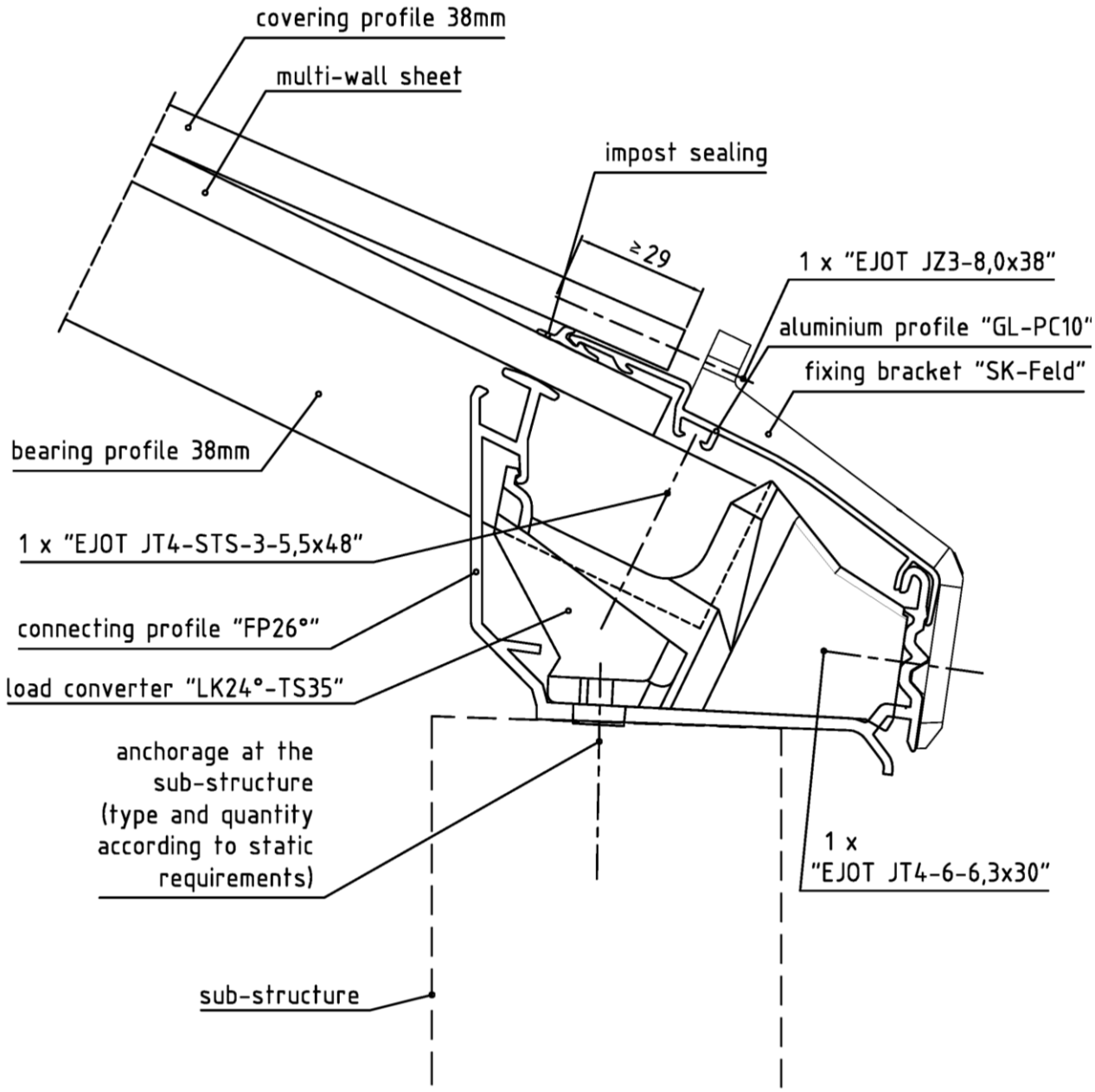
section E-E



LAMILUX CI-System Lichtband B	Annex A 2.1.3
Sectional views Covering type "PC10" Section E-E	

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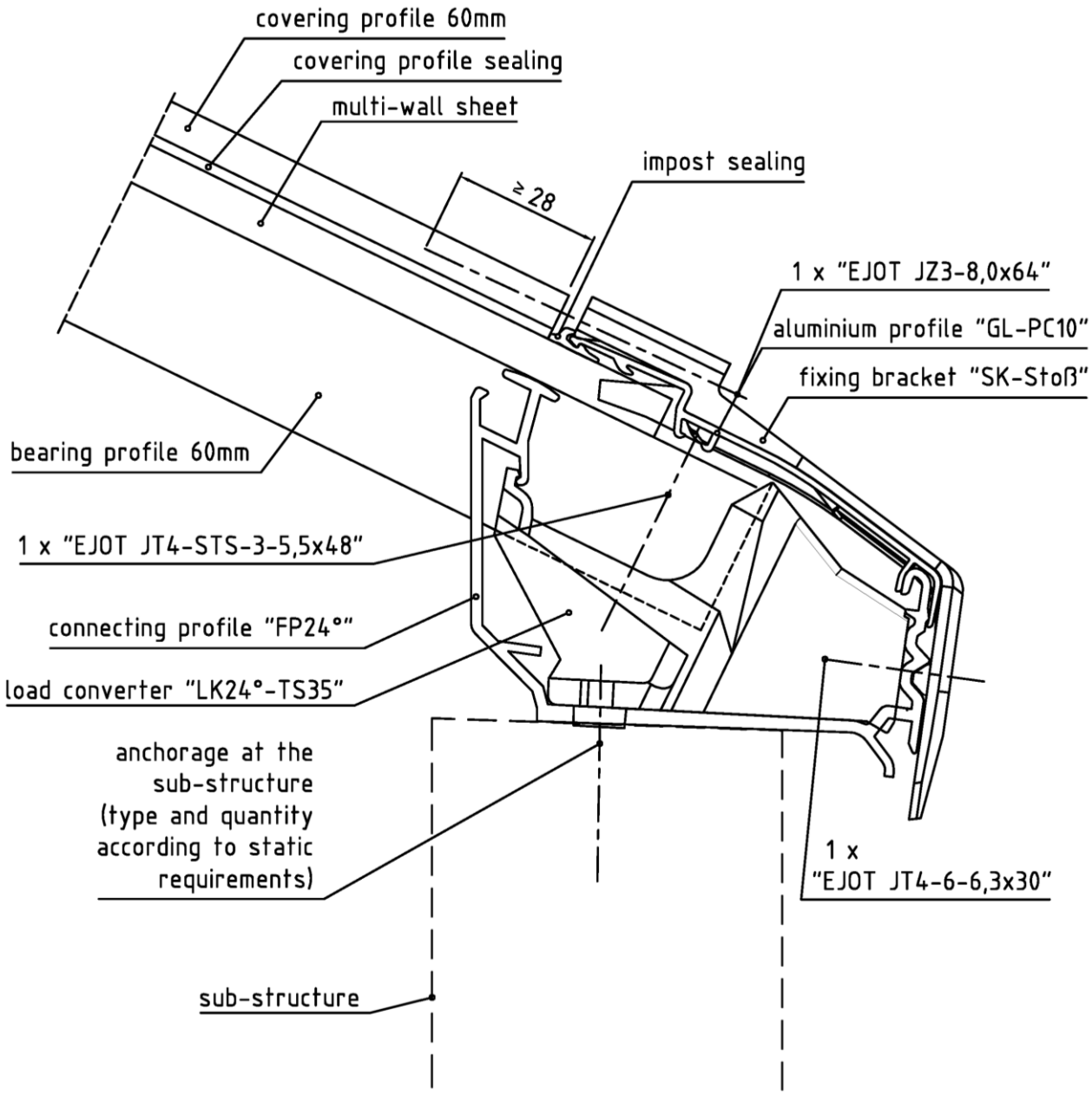
section F-F



LAMILUX CI-System Lichtband B	Annex A 2.1.4
Sectional views Covering type "PC10" Section F-F	

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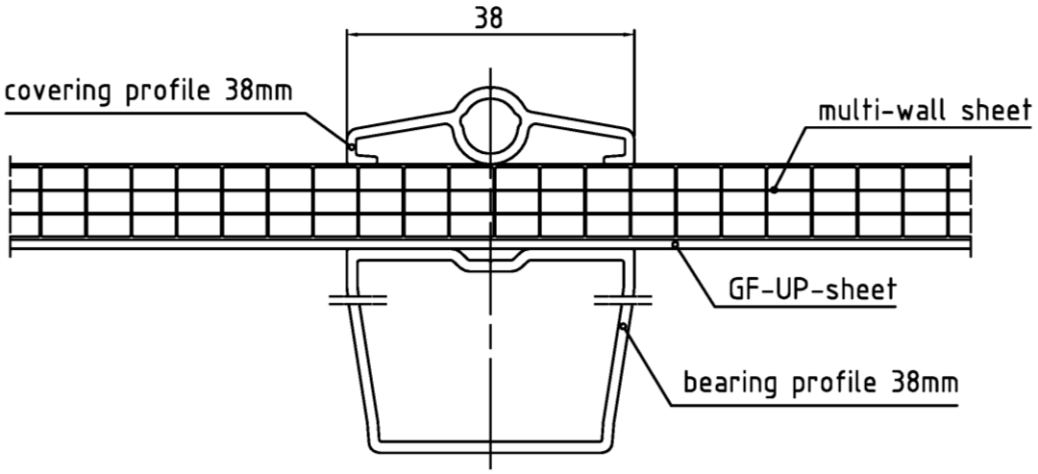
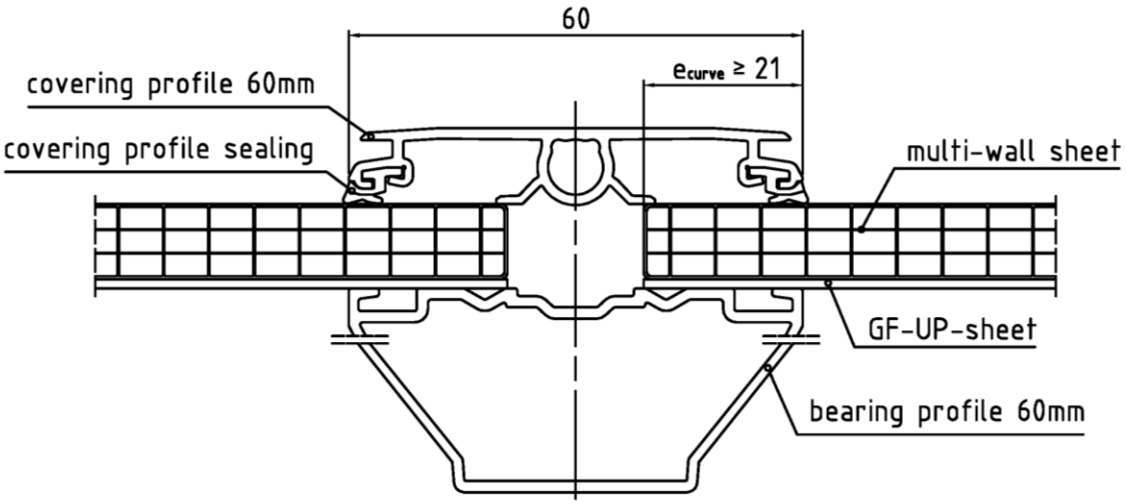
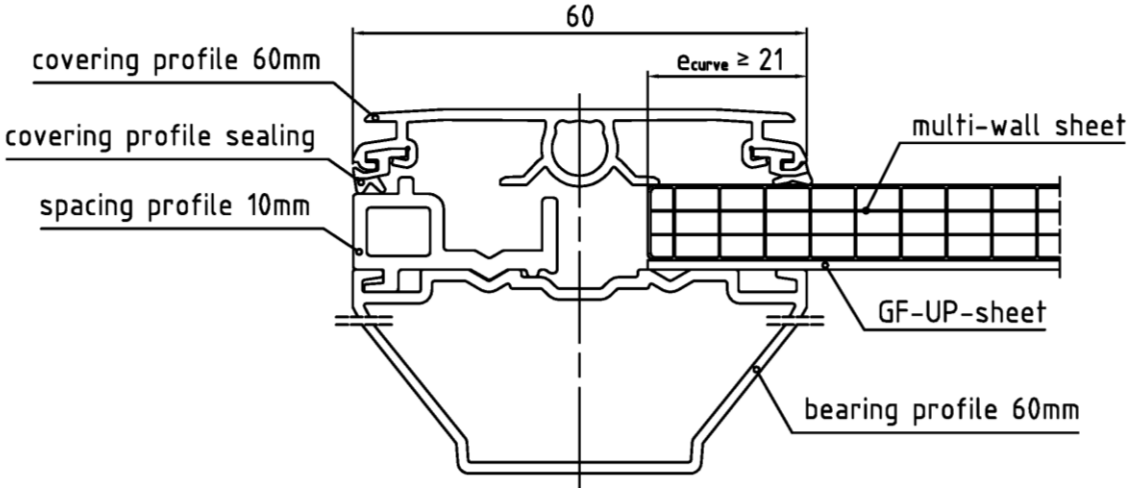
section A-A



section B-B



section C-C



LAMILUX CI-System Lichtband B	Annex A 2.2.1
Sectional views Covering type "PC10 + GFUP" Section A-A; section B-B; section C-C	

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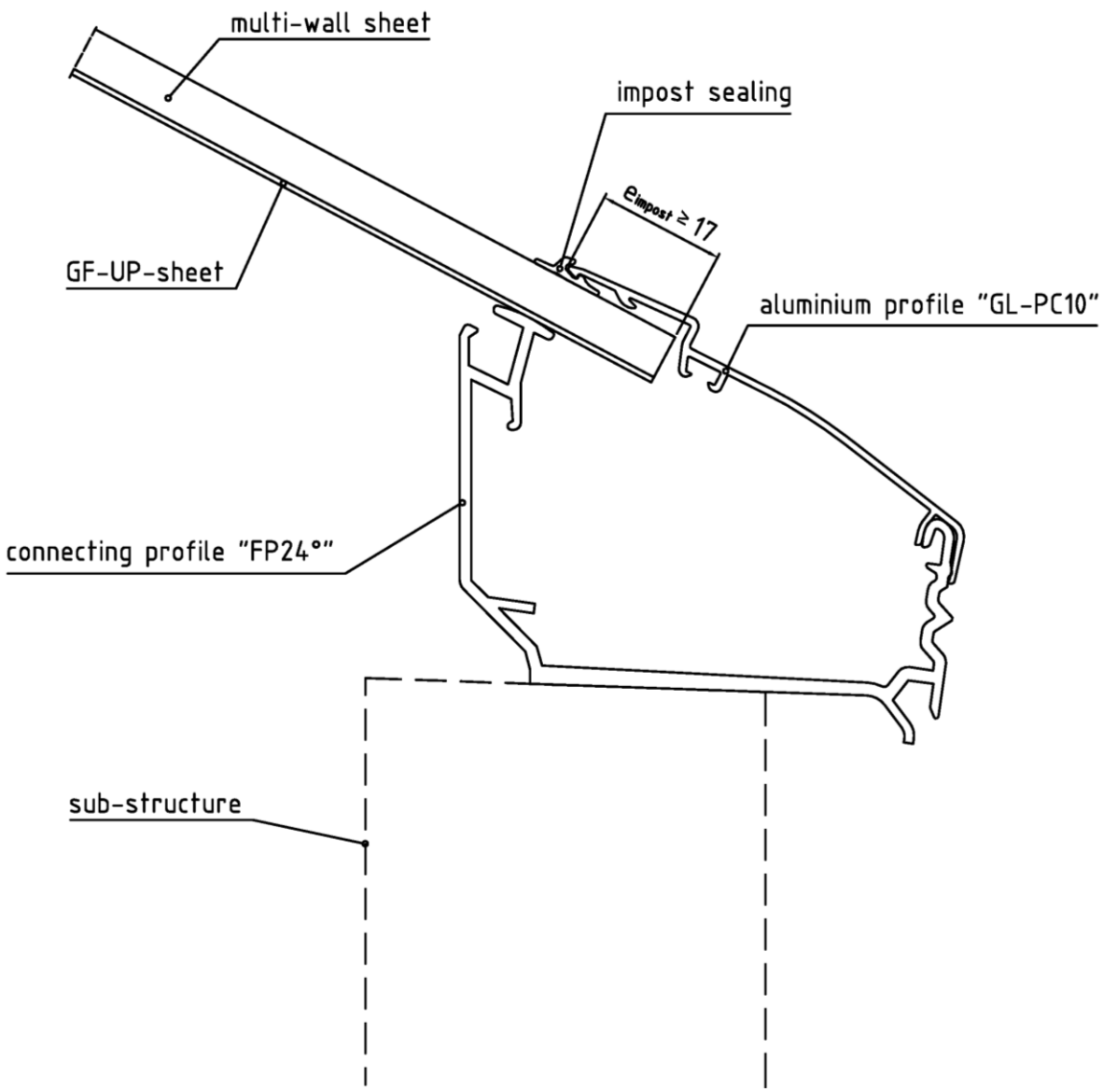
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.2.2
Sectional views Covering type "PC10 + GFUP" Section D-D	

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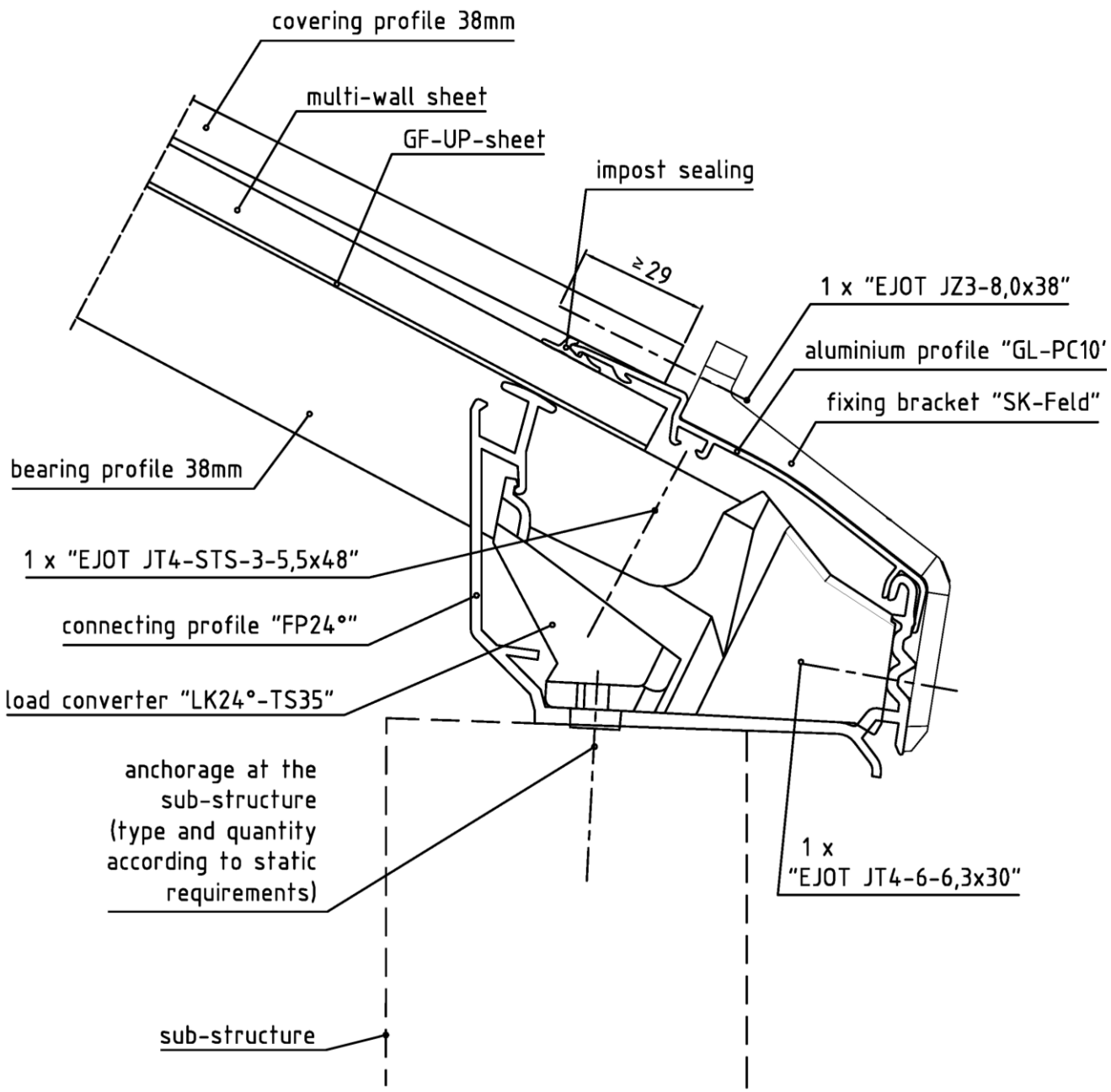

LAMILUX CI-System Lichtband B	Annex A 2.2.3
Sectional views Covering type "PC10 + GFUP" Section E-E	

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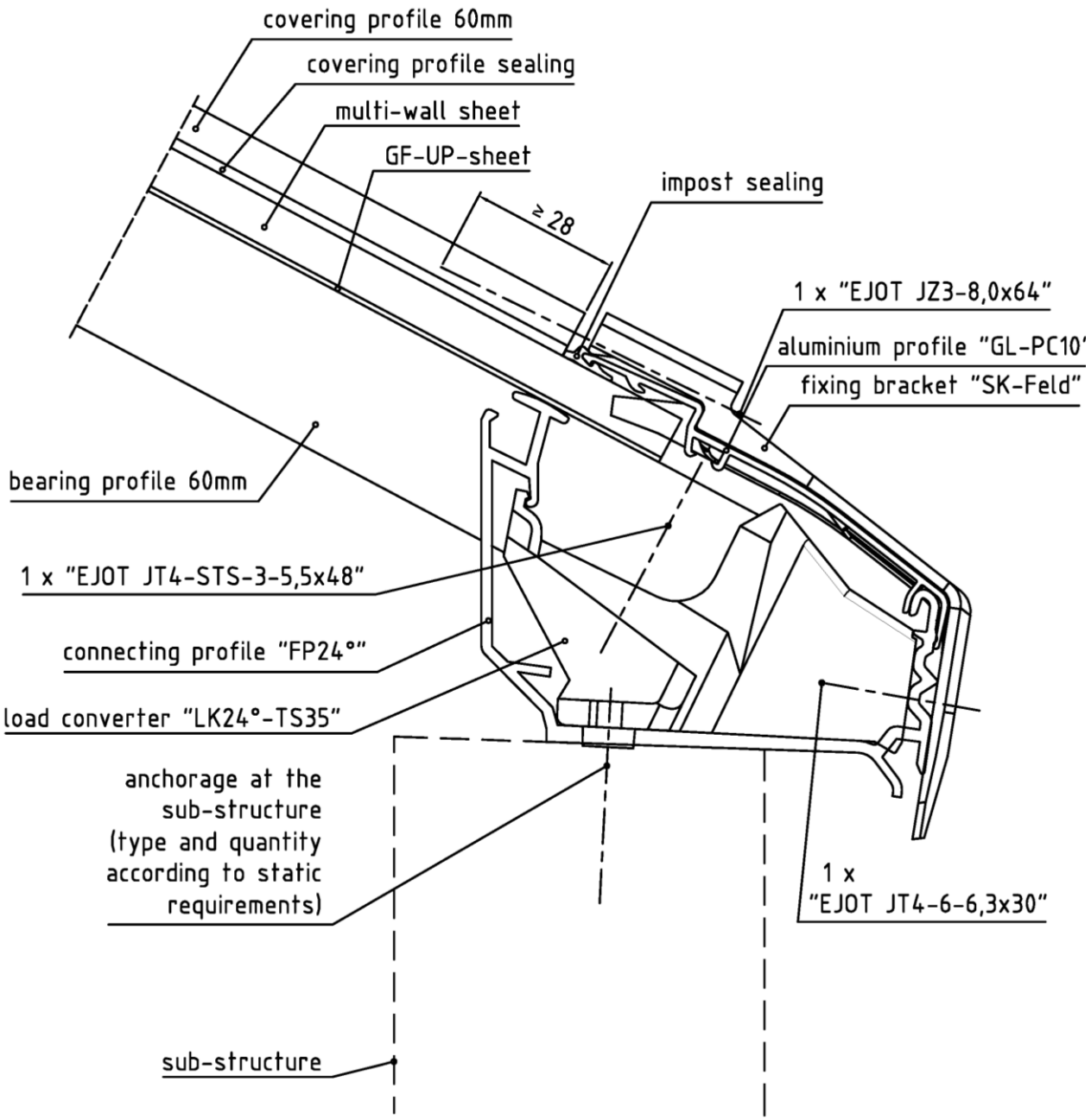

LAMILUX CI-System Lichtband B	Annex A 2.2.4
Sectional views Covering type "PC10 + GFUP" Section F-F	

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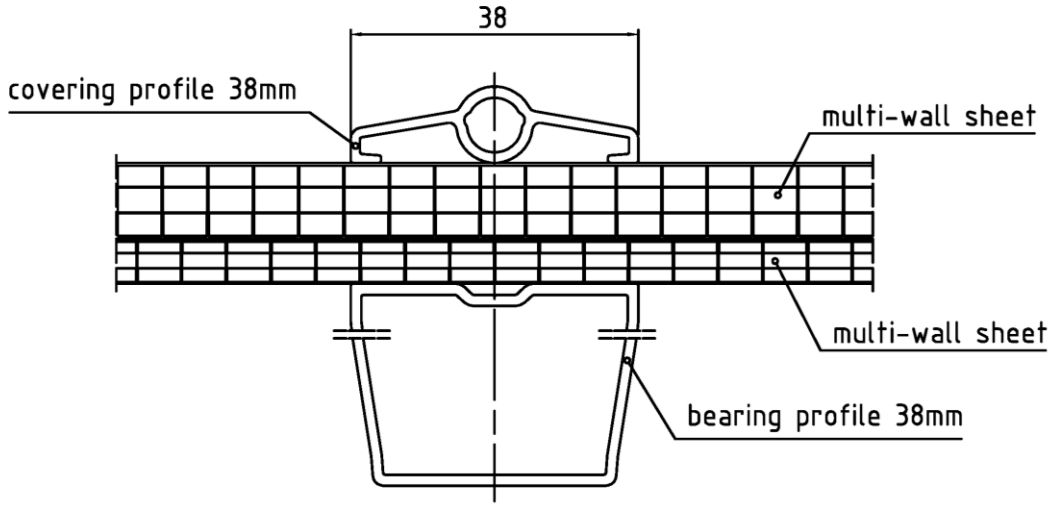
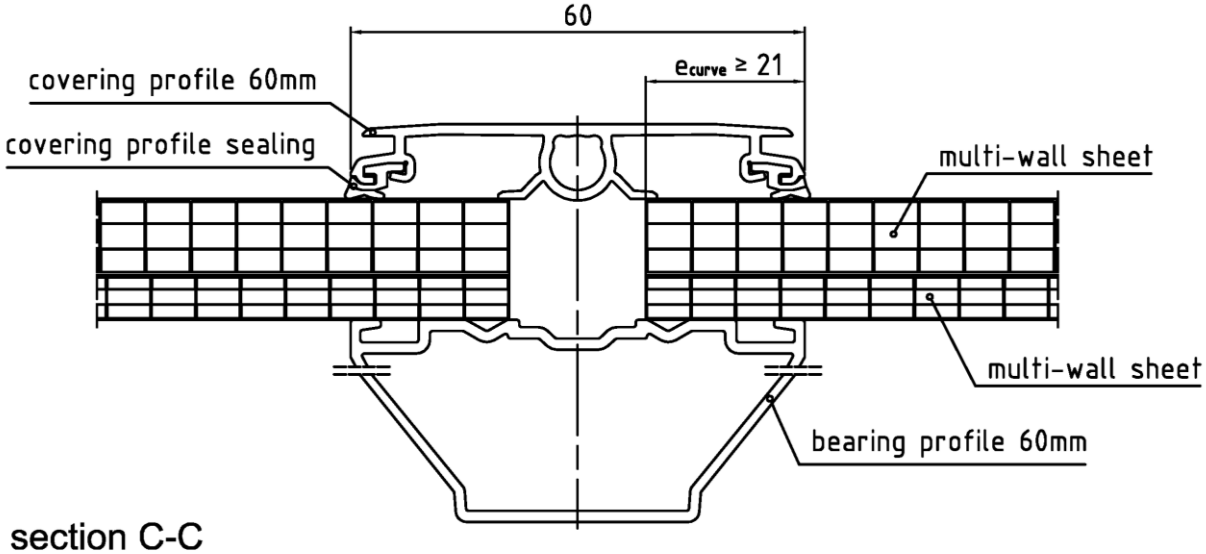
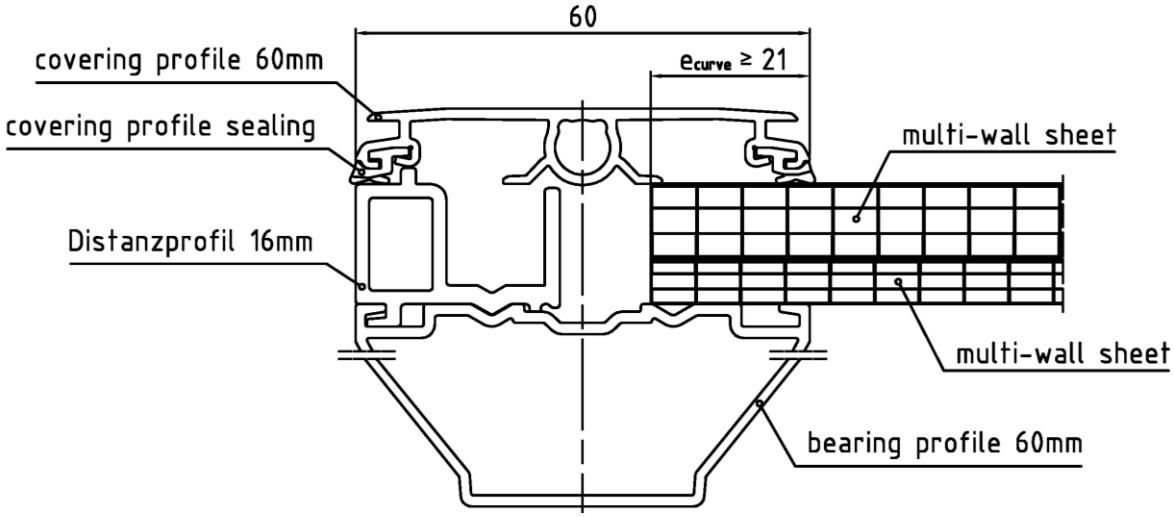
section A-A



section B-B



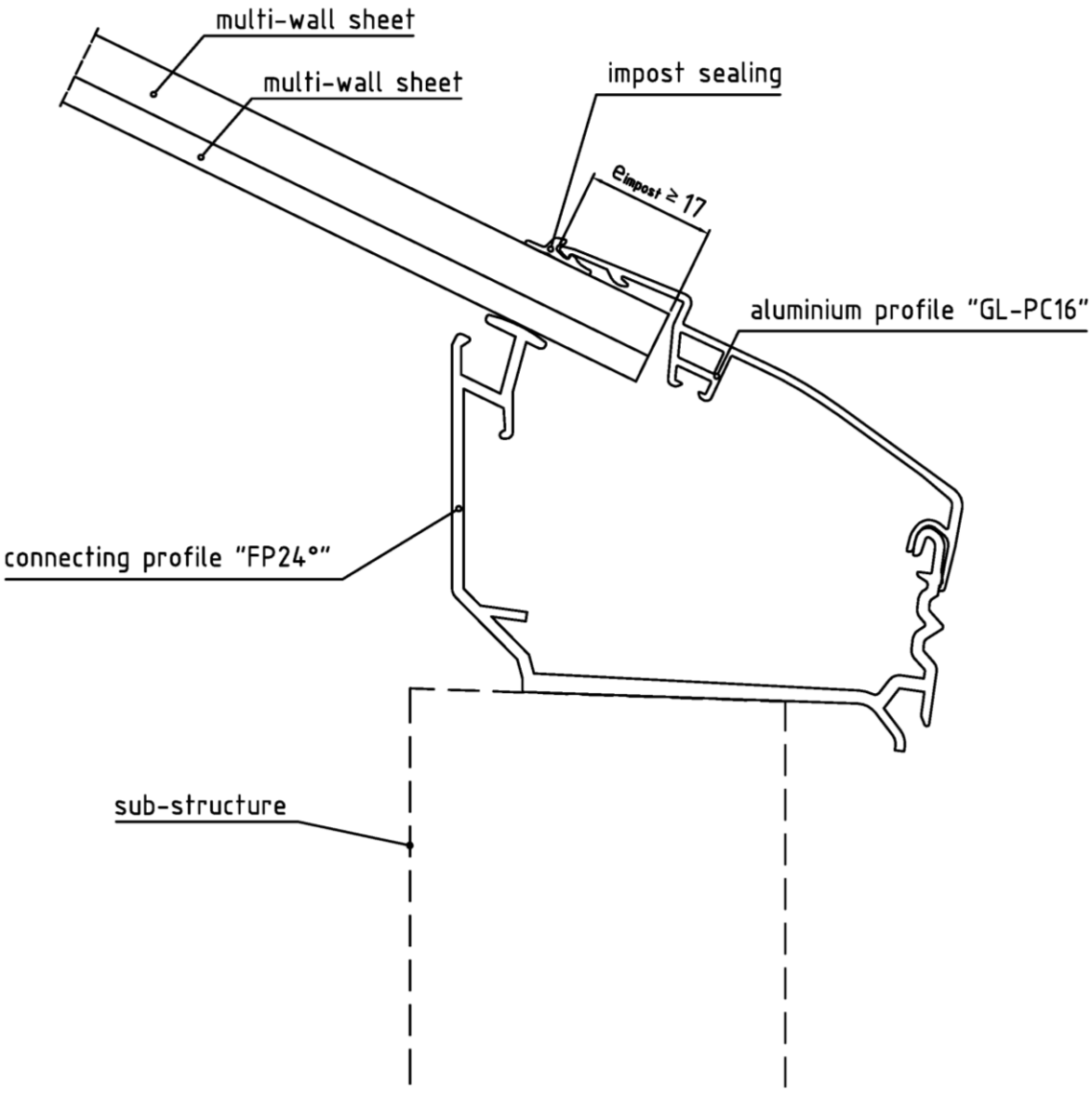
section C-C



LAMILUX CI-System Lichtband B	Annex A 2.3.1
Sectional views Covering type "PC10 + PC6" Section A-A; section B-B; section C-C	

Deutsches Institut für Bautechnik DIBt

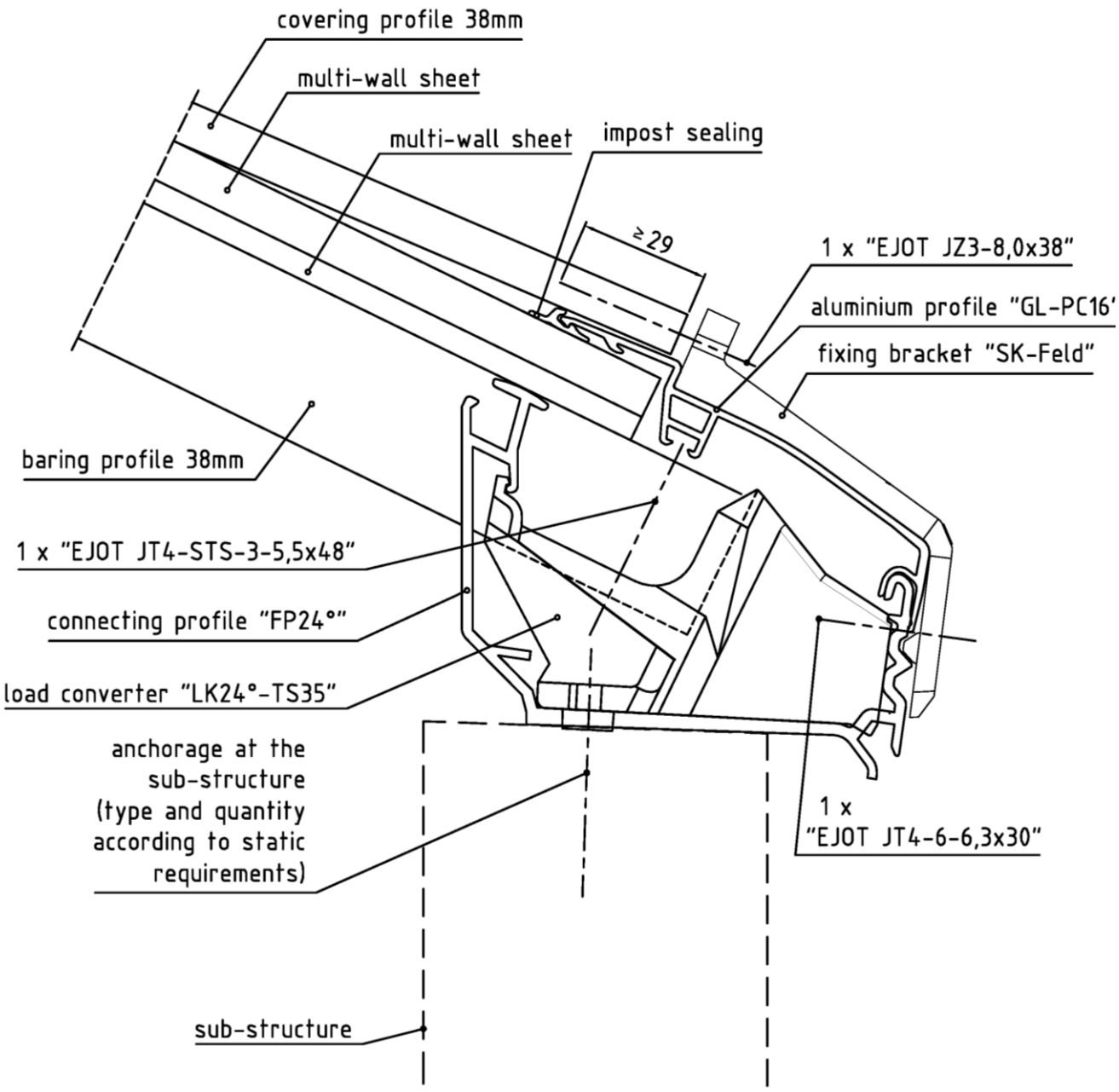
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.3.2
Sectional views Covering type "PC10 + PC6" Section D-D	

Deutsches Institut für Bautechnik DIBt

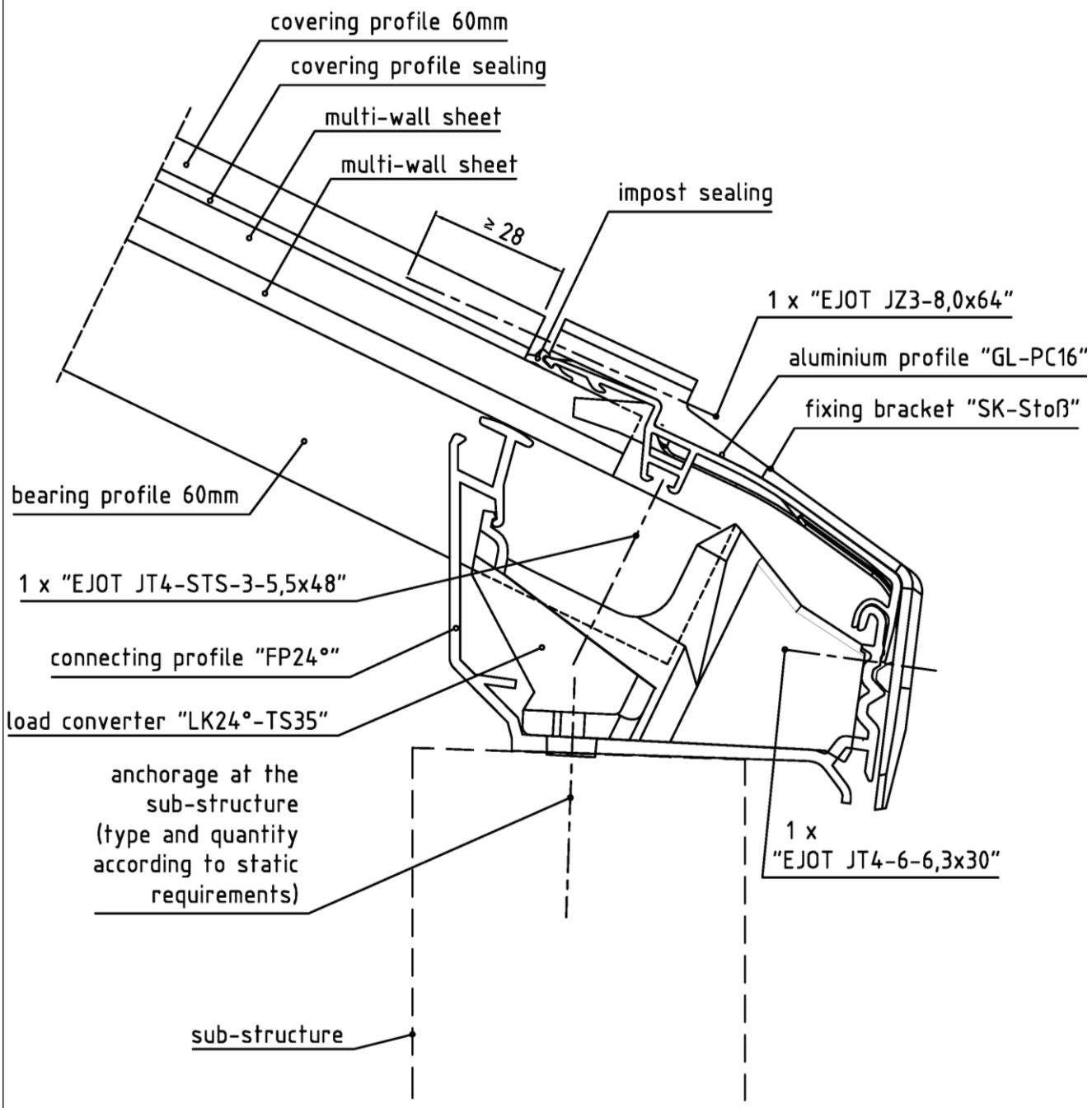
section E-E



LAMILUX CI-System Lichtband B	Annex A 2.3.3
Sectional views Covering type "PC10 + PC6" Section E-E	

Deutsches Institut für Bautechnik DIBt

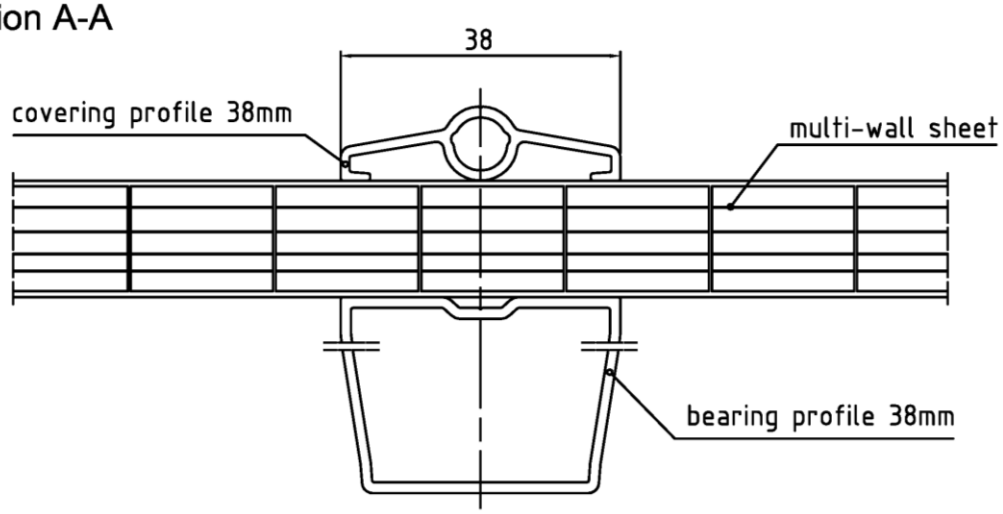
section F-F



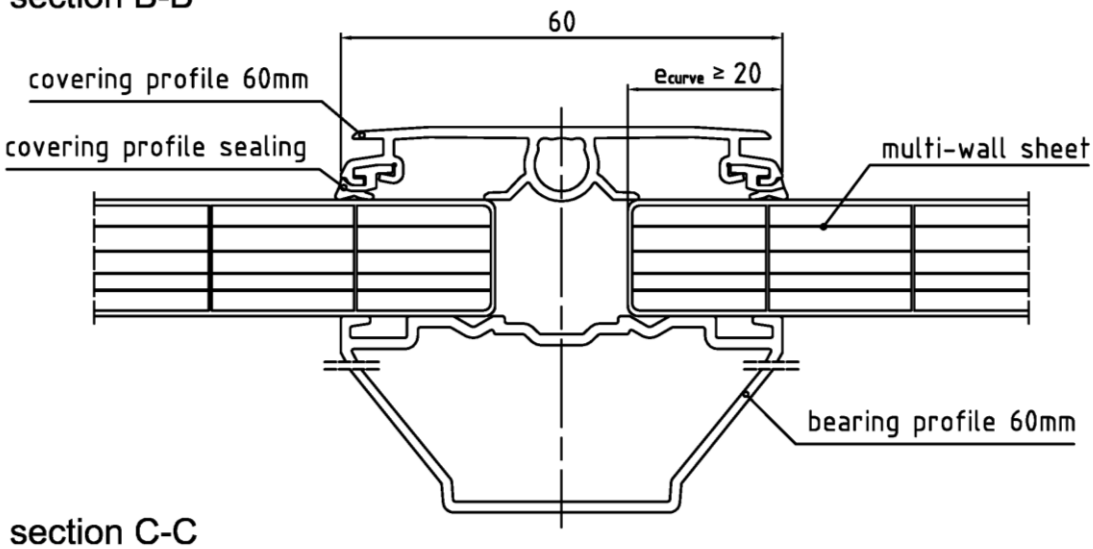
LAMILUX CI-System Lichtband B	Annex A 2.3.4
Sectional views Covering type "PC10 + PC6" Section F-F	

Deutsches Institut für Bautechnik DIBt

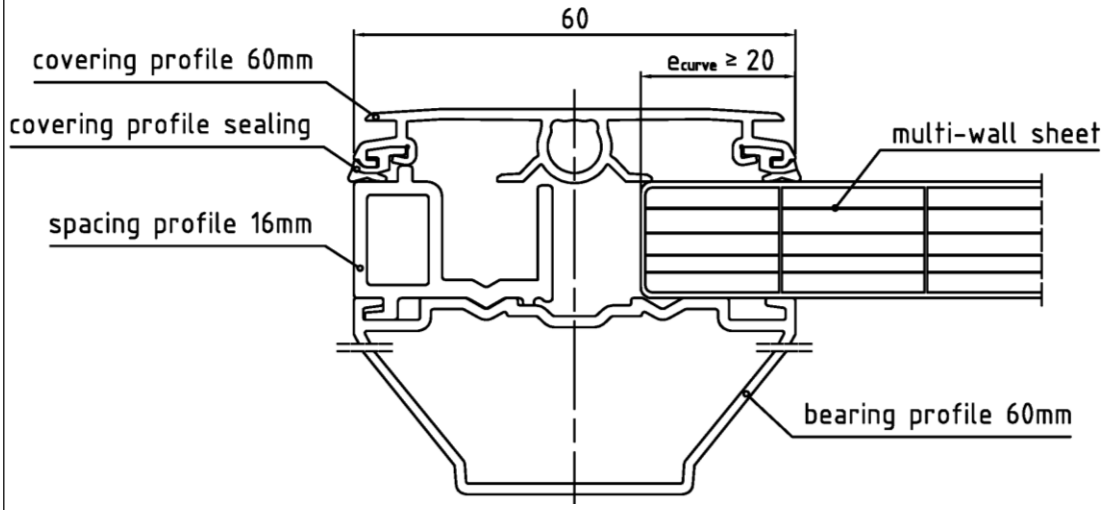
section A-A



section B-B



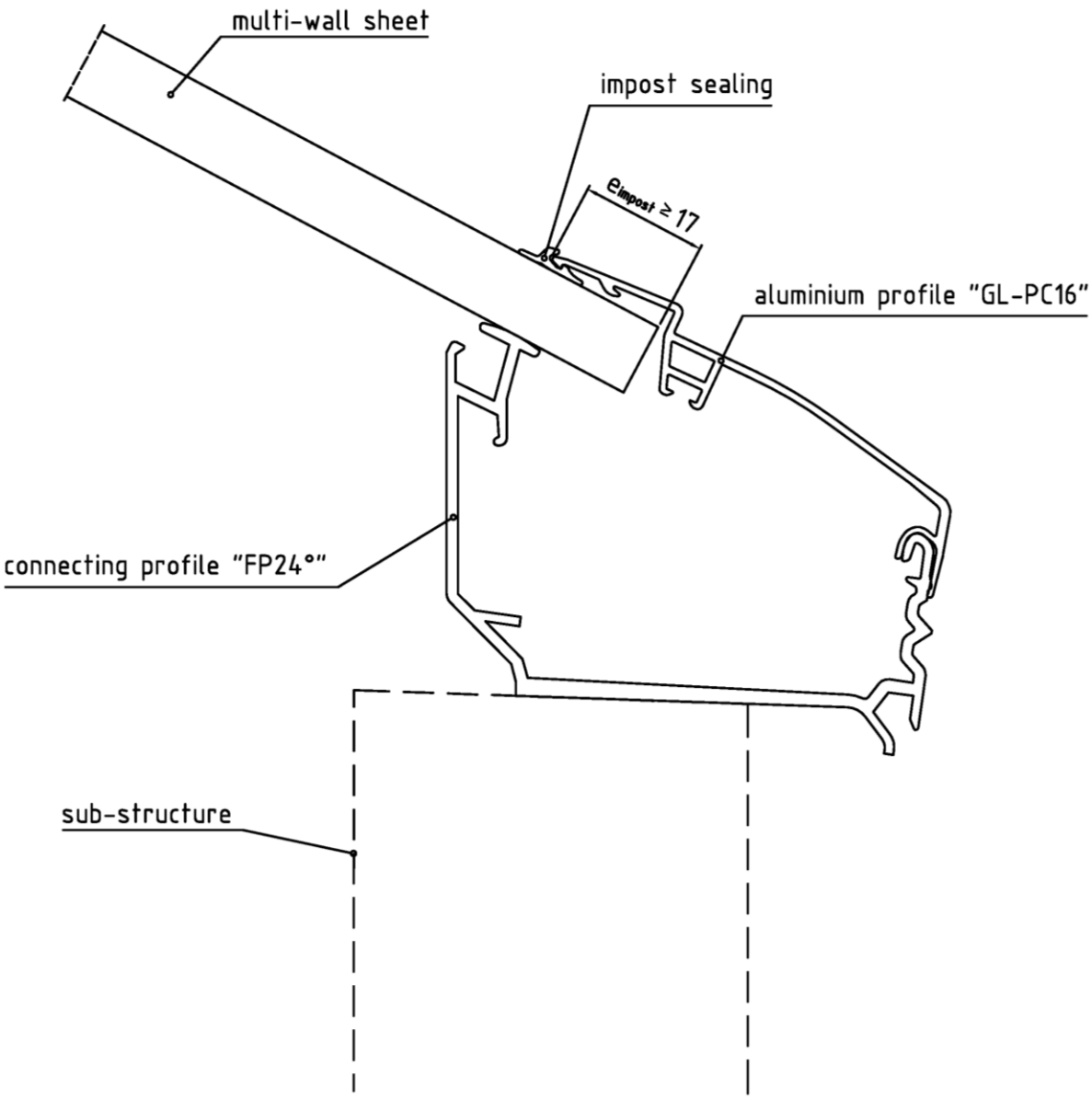
section C-C



LAMILUX CI-System Lichtband B	Annex A 2.4.1
Sectional views Covering type "PC16" Section A-A; section B-B; section C-C	

Deutsches Institut für Bautechnik DIBt

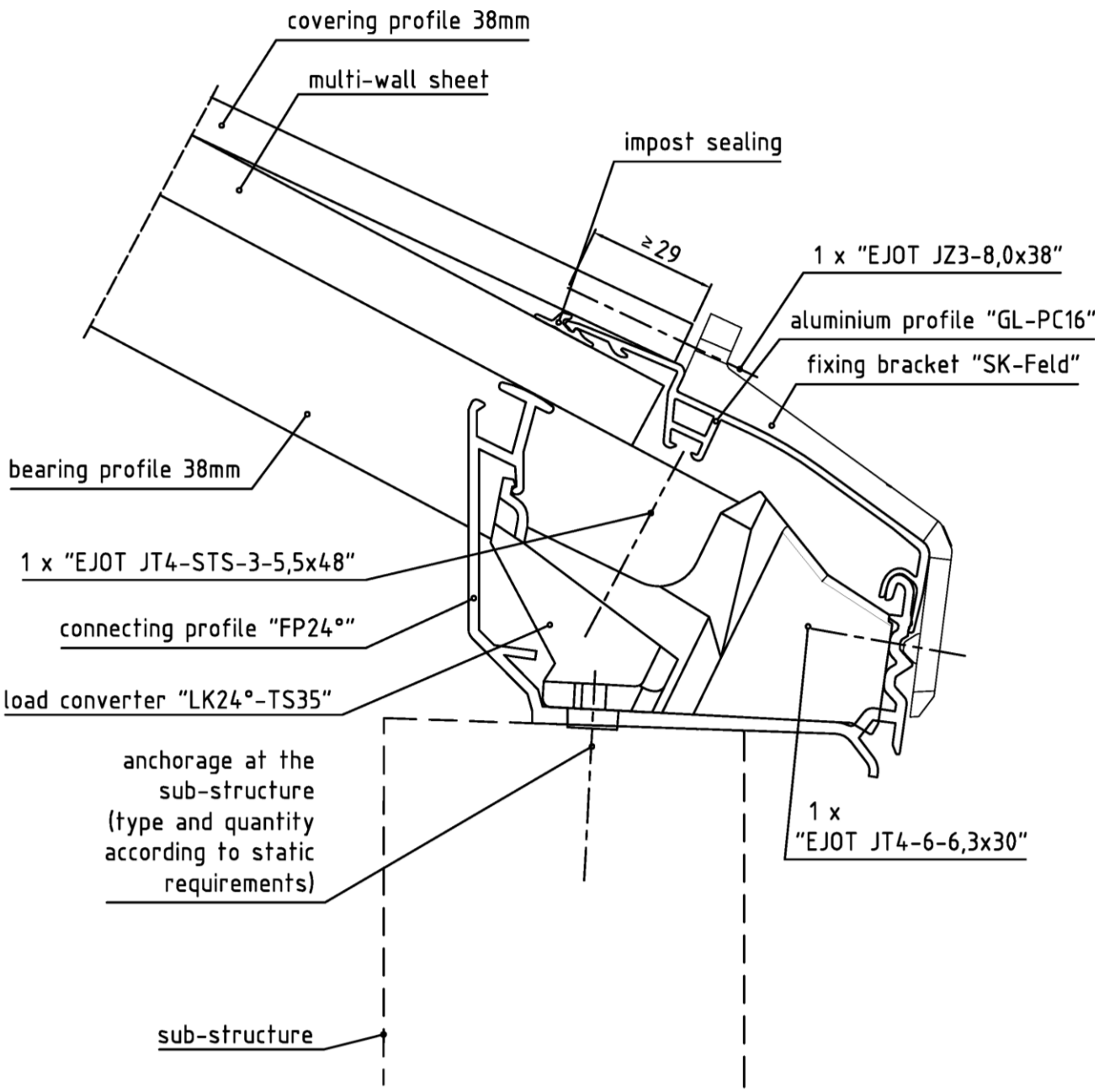
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.4.2
Sectional views Covering type "PC16" Section D-D	

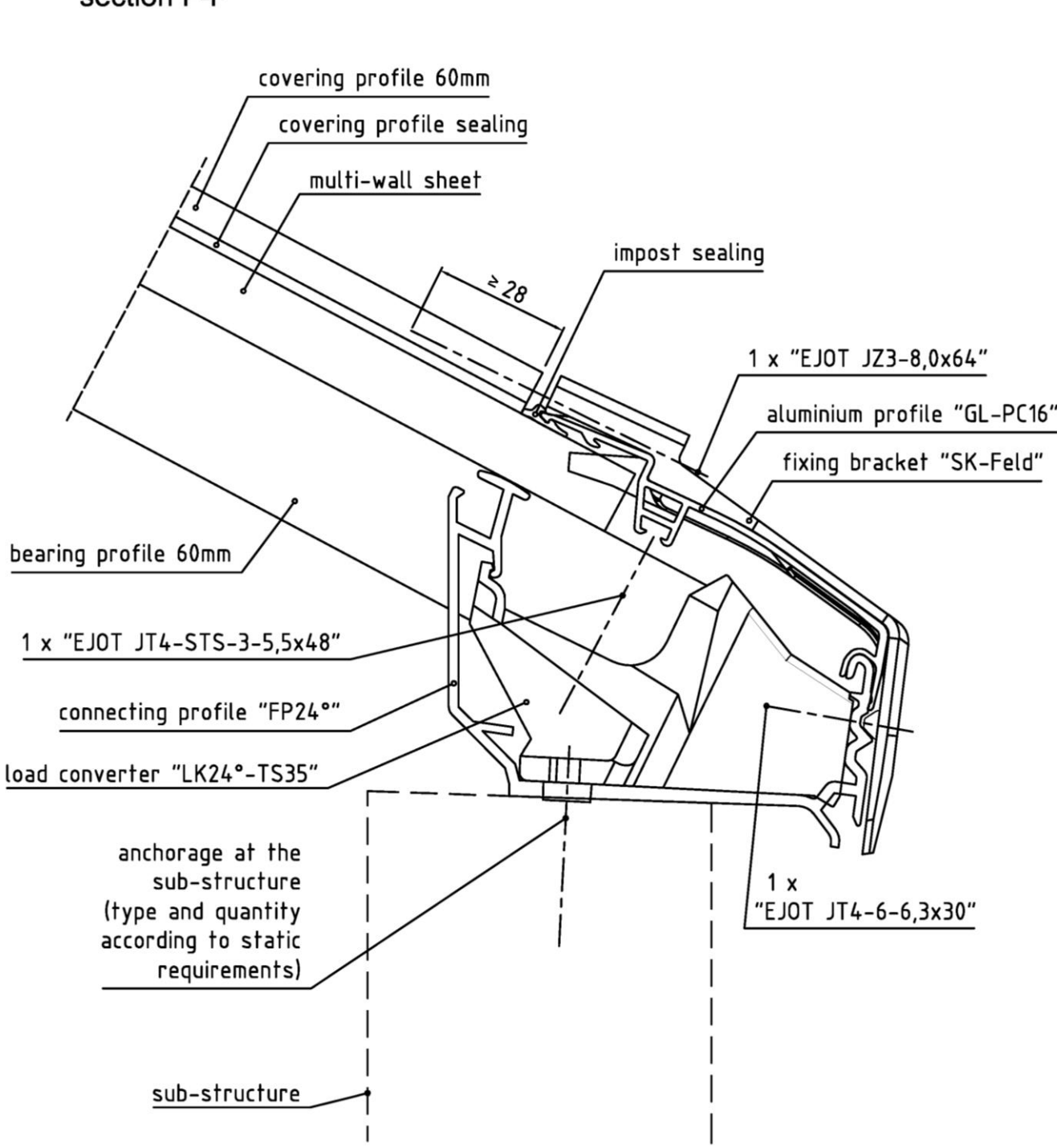
Deutsches Institut für Bautechnik DIBt

section E-E



LAMILUX CI-System Lichtband B	Annex A 2.4.3
Sectional views Covering type "PC16" Section E-E	

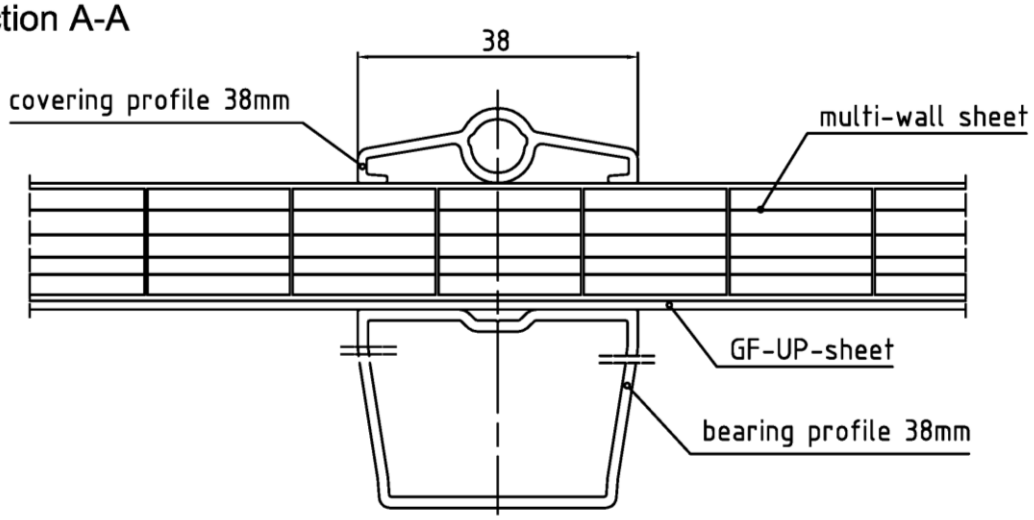
Deutsches Institut für Bautechnik DIBt



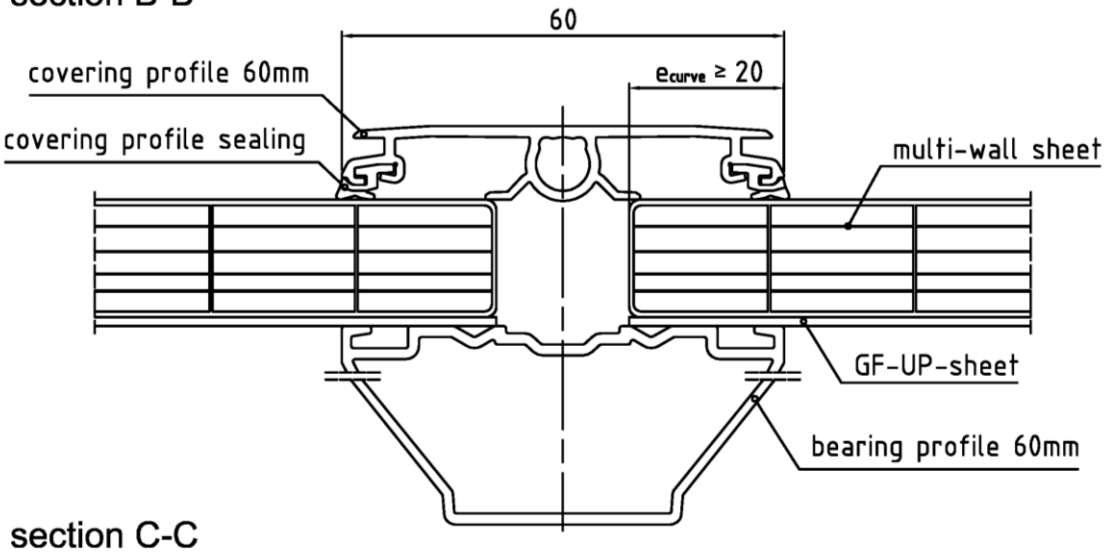
LAMILUX CI-System Lichtband B	Annex A 2.4.4
Sectional views Covering type "PC16" Section F-F	

Deutsches Institut für Bautechnik DIBt

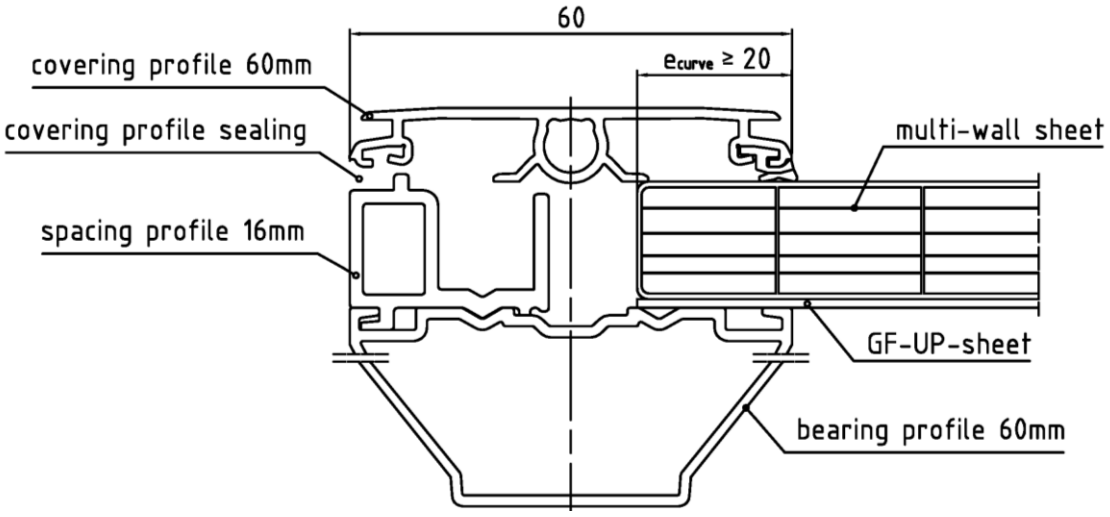
section A-A



section B-B



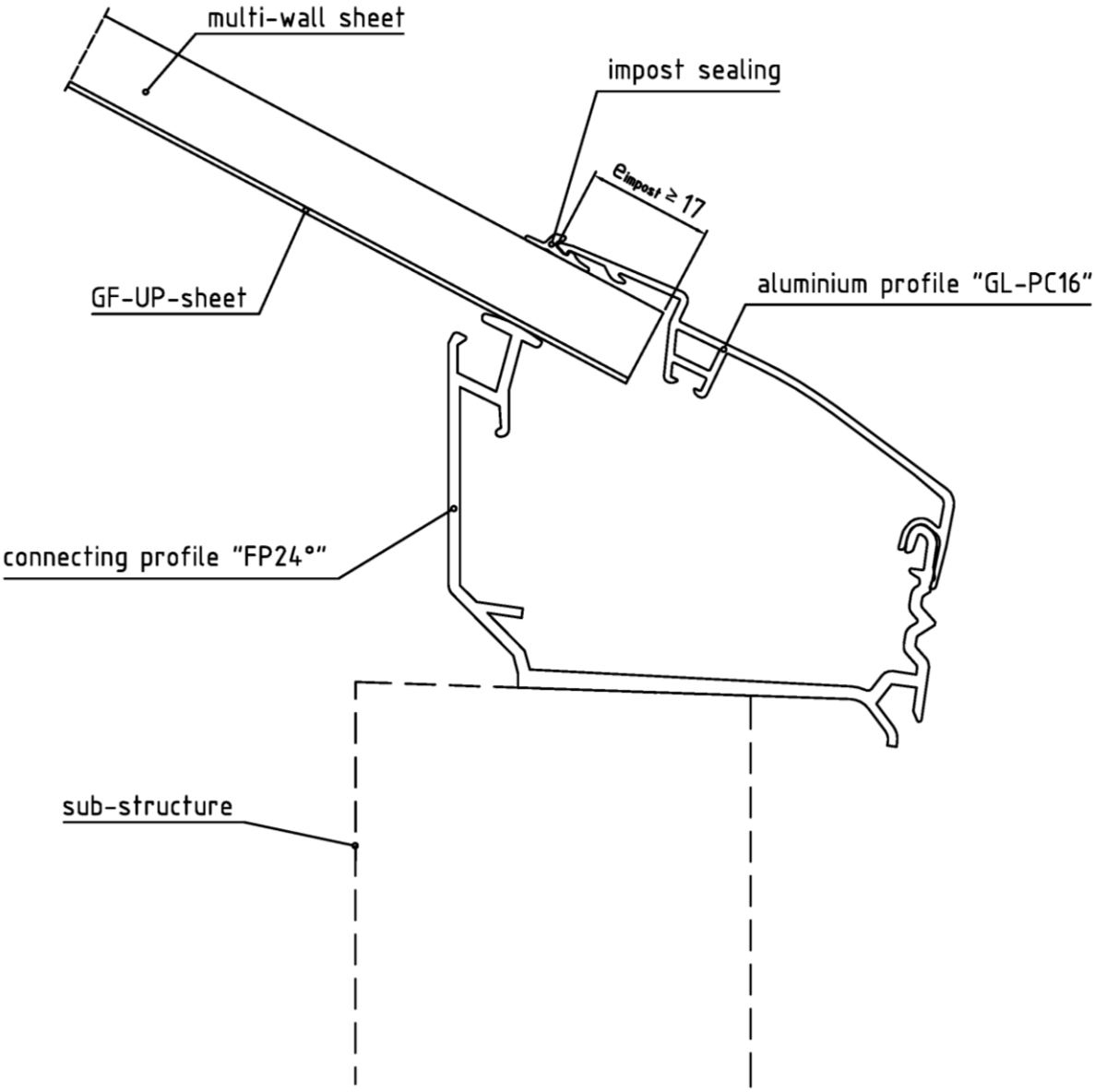
section C-C



LAMILUX CI-System Lichtband B	Annex A 2.5.1
Sectional views Covering type "PC16 + GFUP" Section A-A; section B-B; section C-C	

Deutsches Institut für Bautechnik DIBt

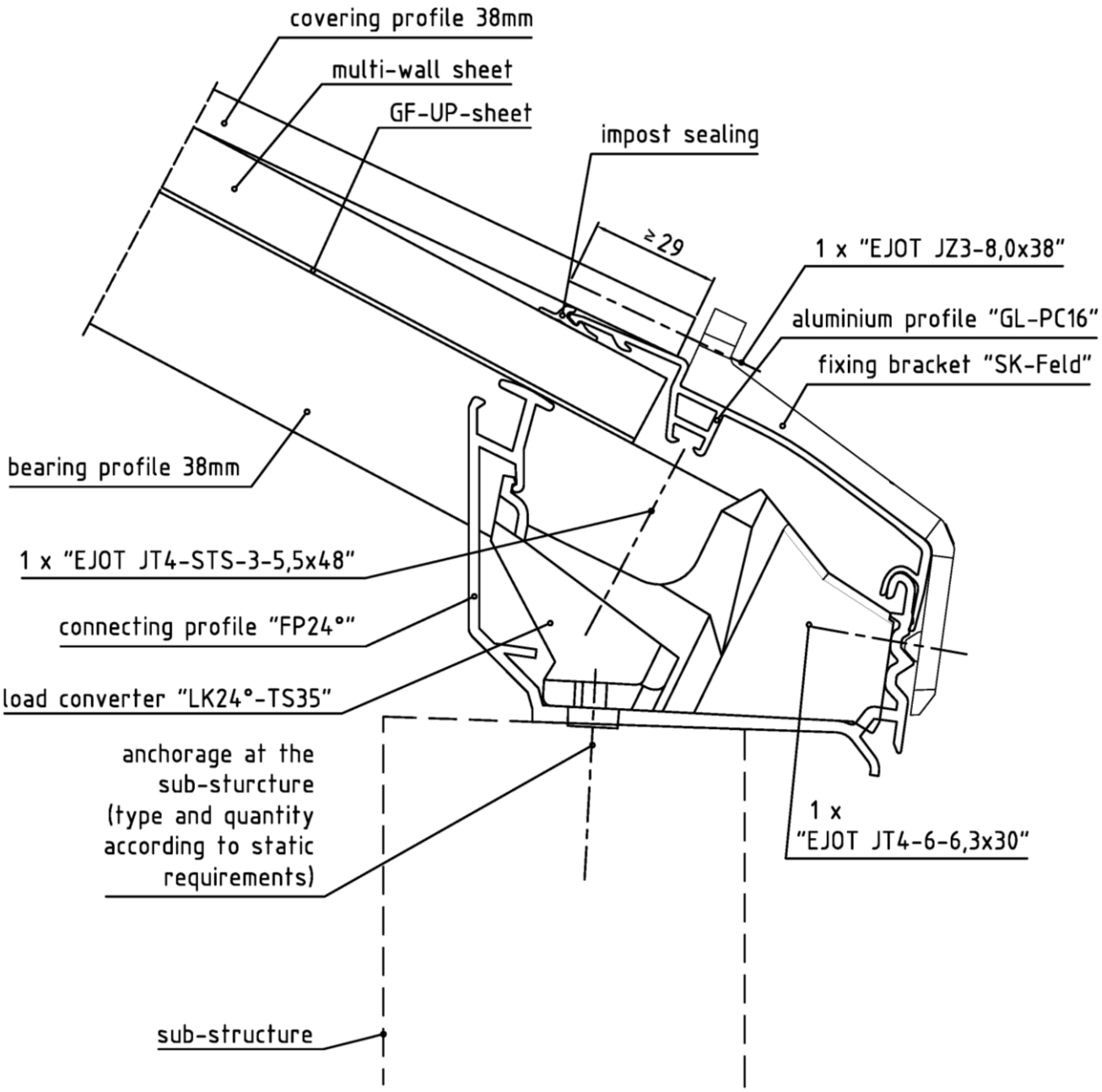
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.5.2
Sectional views Covering type "PC16 + GFUP" Section D-D	

Deutsches Institut für Bautechnik DIBt

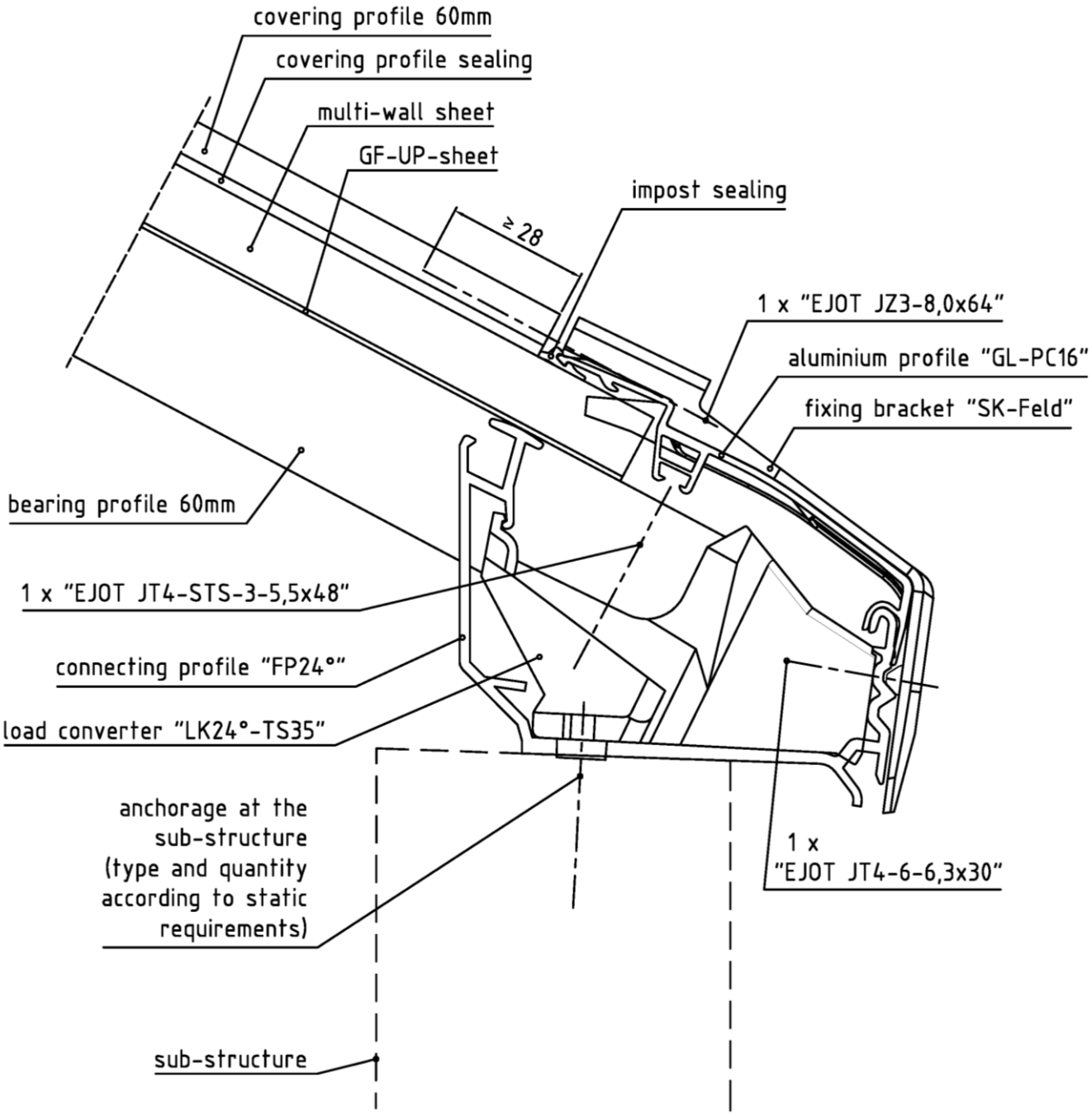
section E-E



LAMILUX CI-System Lichtband B	Annex A 2.5.3
Sectional views Covering type "PC16 + GFUP" Section E-E	

Deutsches Institut für Bautechnik DIBt

section F-F



LAMILUX CI-System Lichtband B	Annex A 2.5.4
Sectional views Covering type "PC16 + GFUP" Section F-F	

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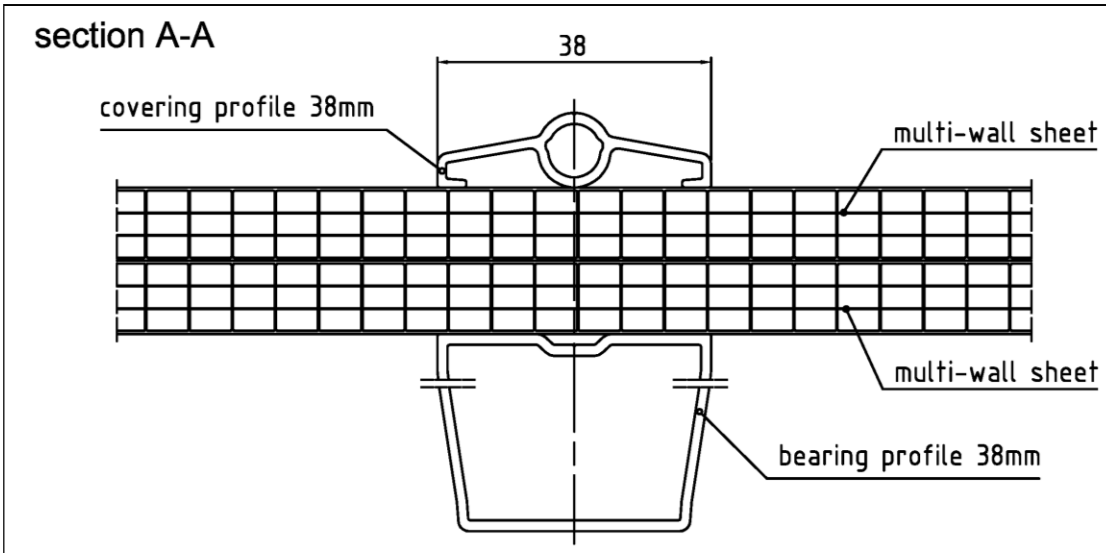
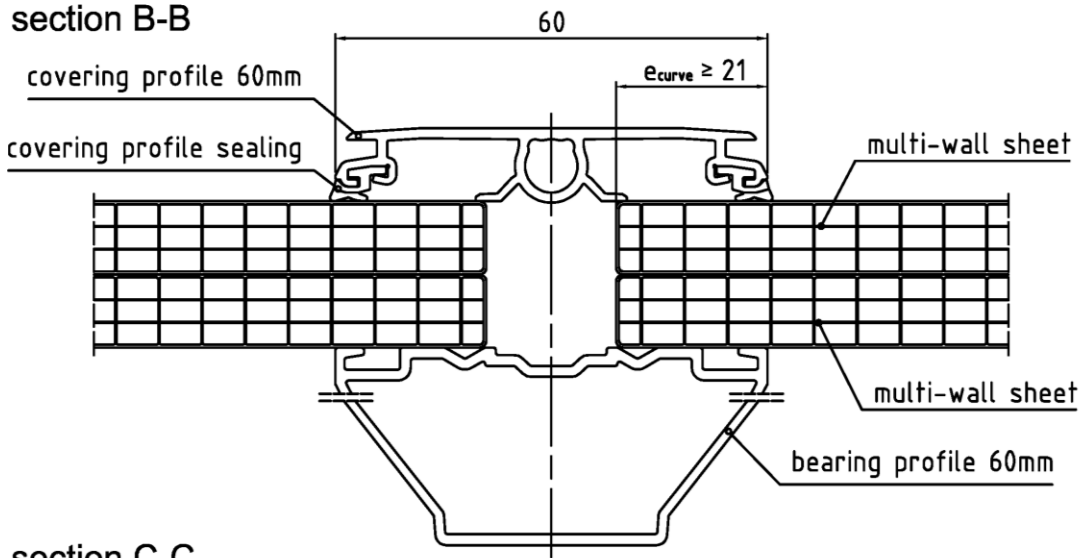
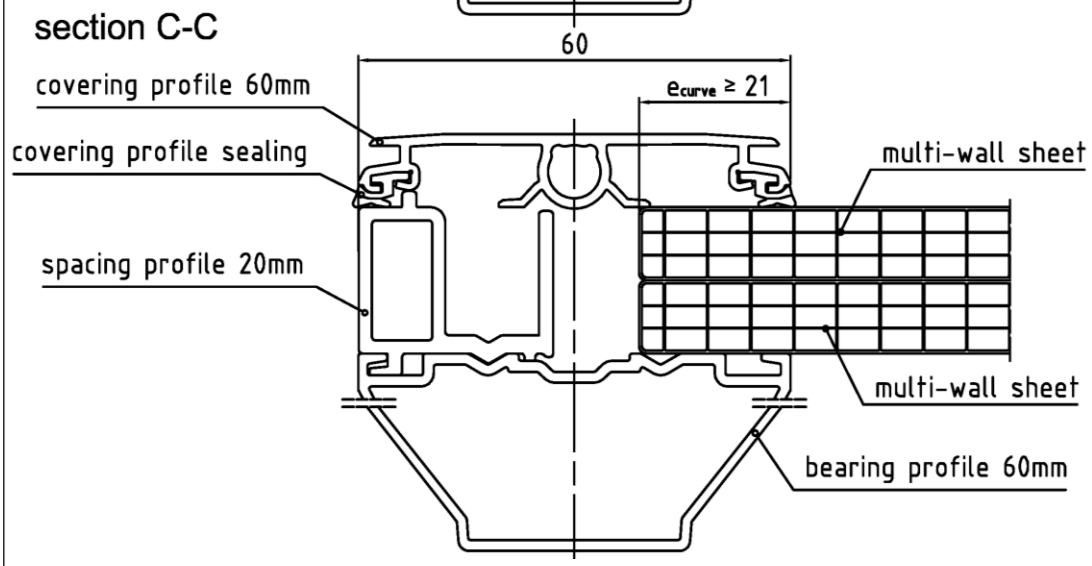


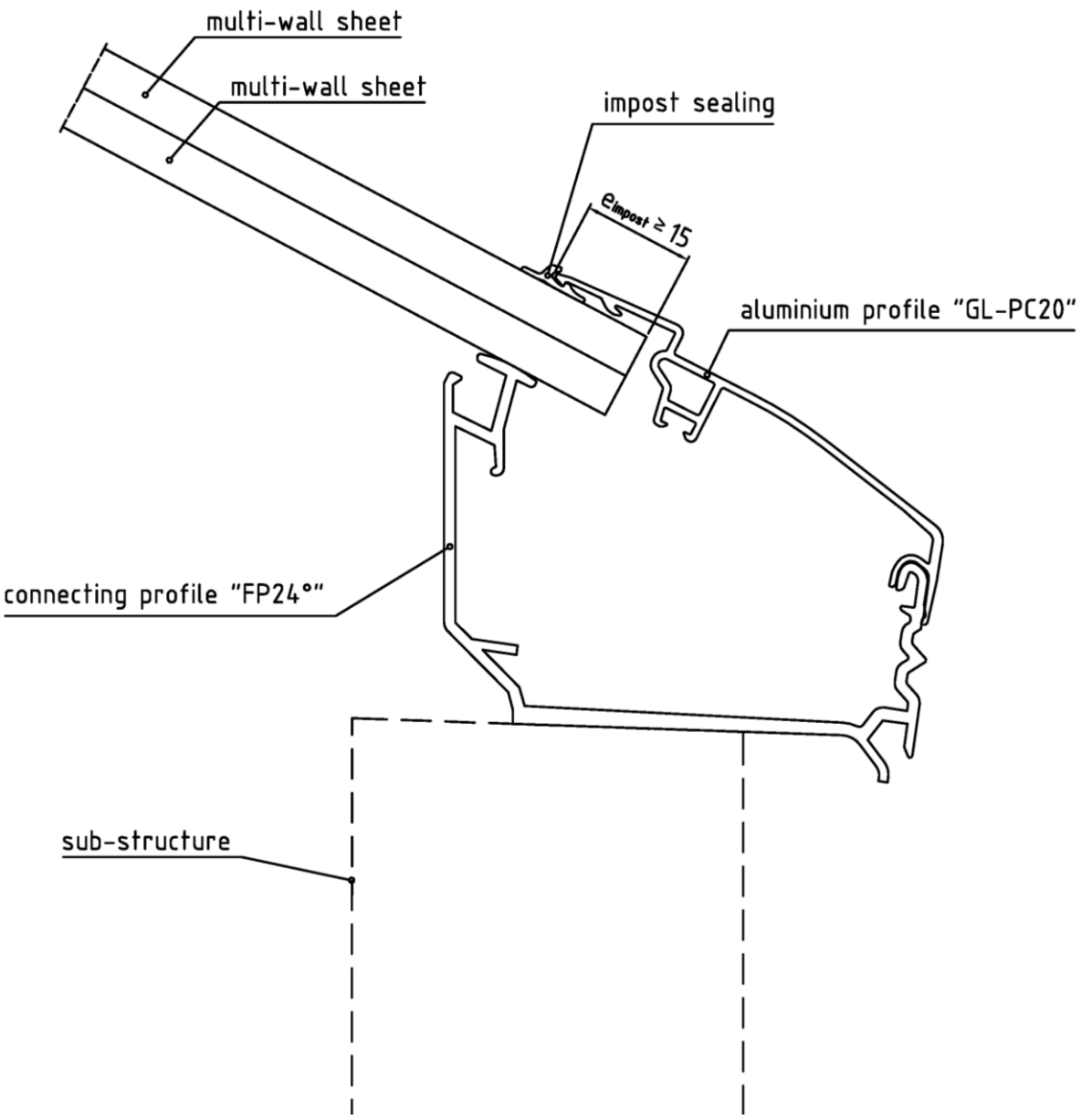




LAMILUX CI-System Lichtband B	Annex A 2.6.1
Sectional views Covering type "PC10 + PC10" Section A-A; section B-B; section C-C	

Deutsches Institut für Bautechnik DIBt

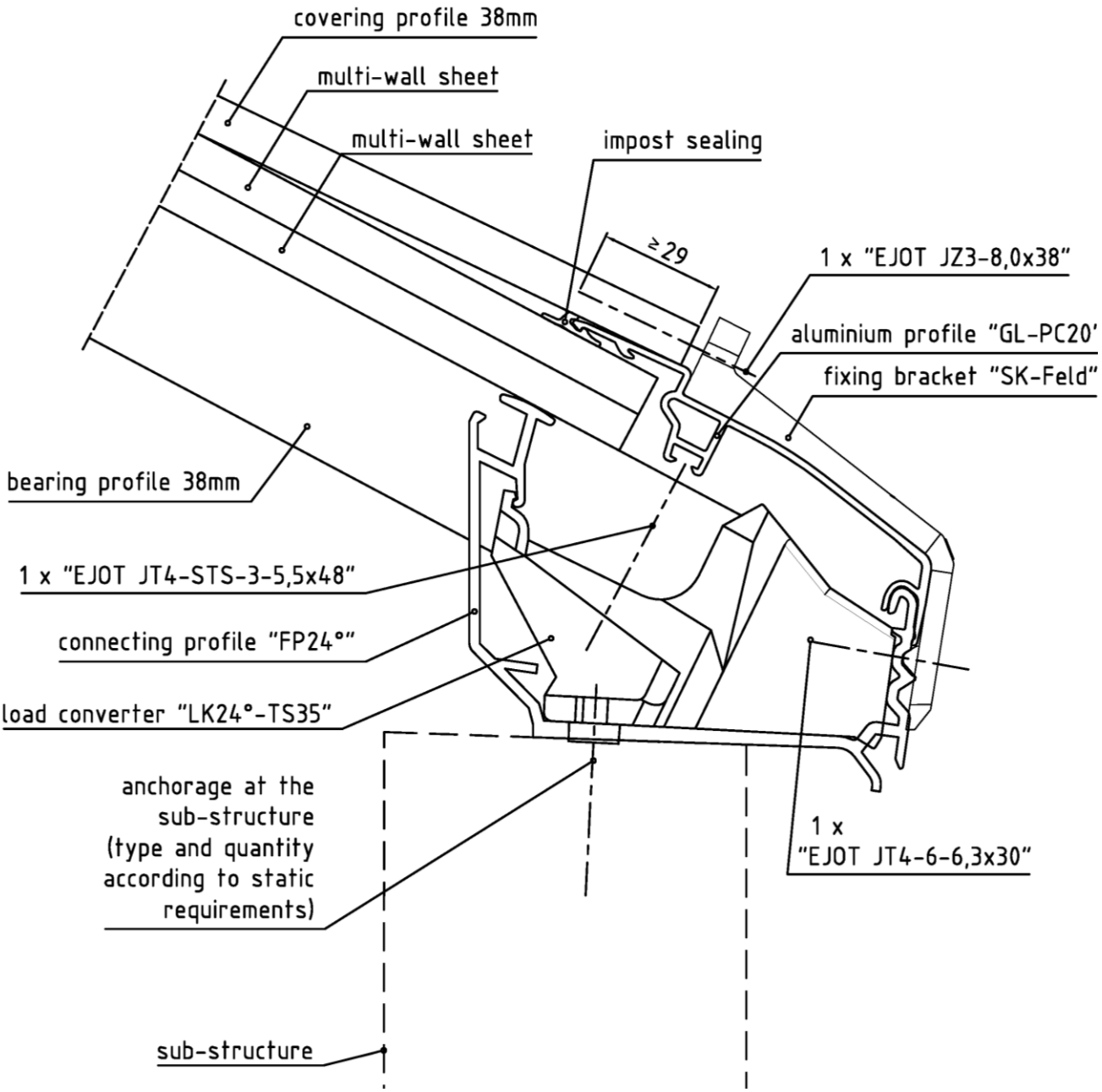
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.6.2
Sectional views Covering type "PC10 + PC10" Section D-D	

Deutsches Institut für Bautechnik DIBt

section E-E



LAMILUX CI-System Lichtband B	Annex A 2.6.3
Sectional views Covering type "PC10 + PC10" Section E-E	

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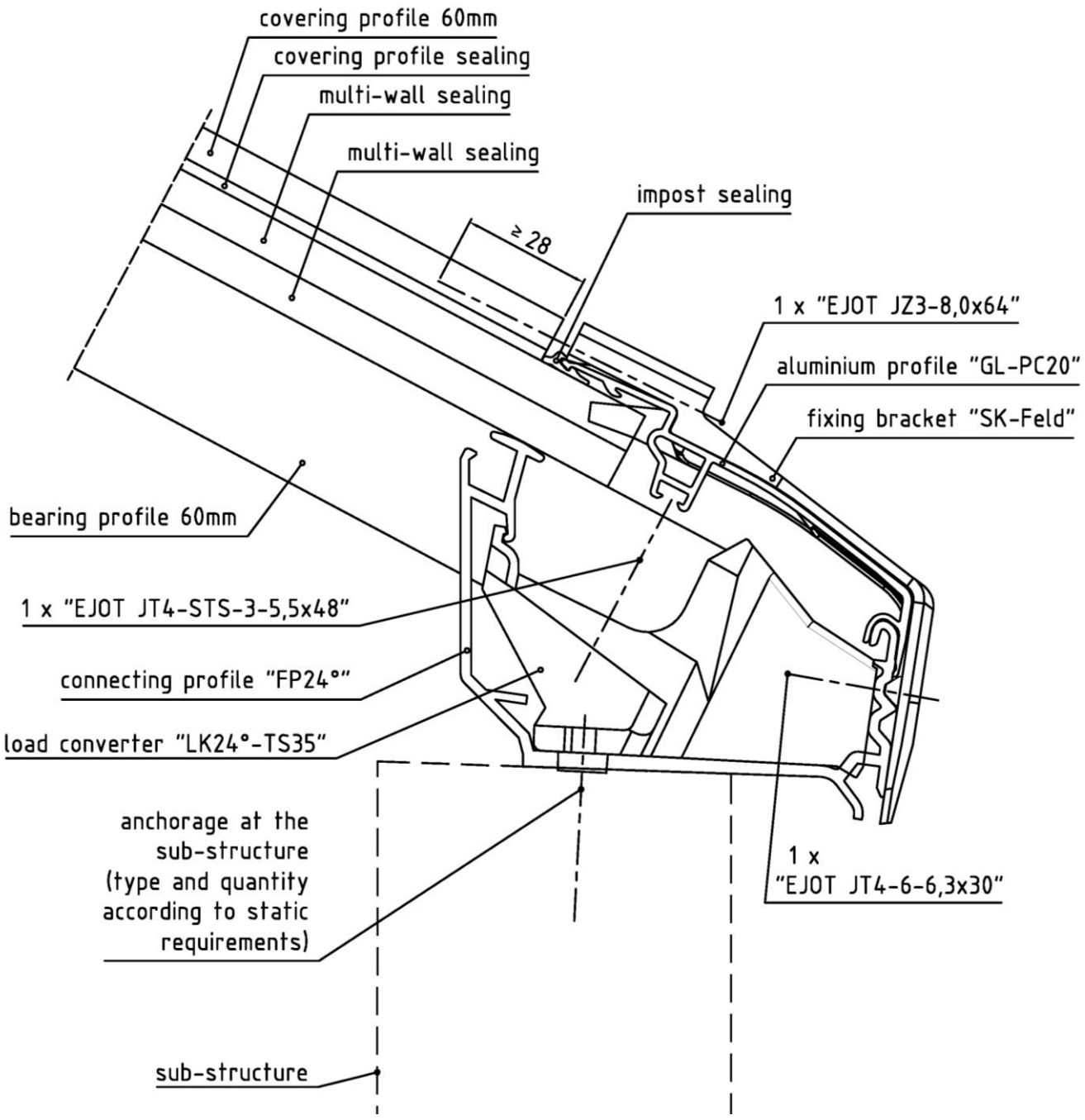
section F-F



LAMILUX CI-System Lichtband B	Annex A 2.6.4
Sectional views Covering type "PC10 + PC10" Section F-F	

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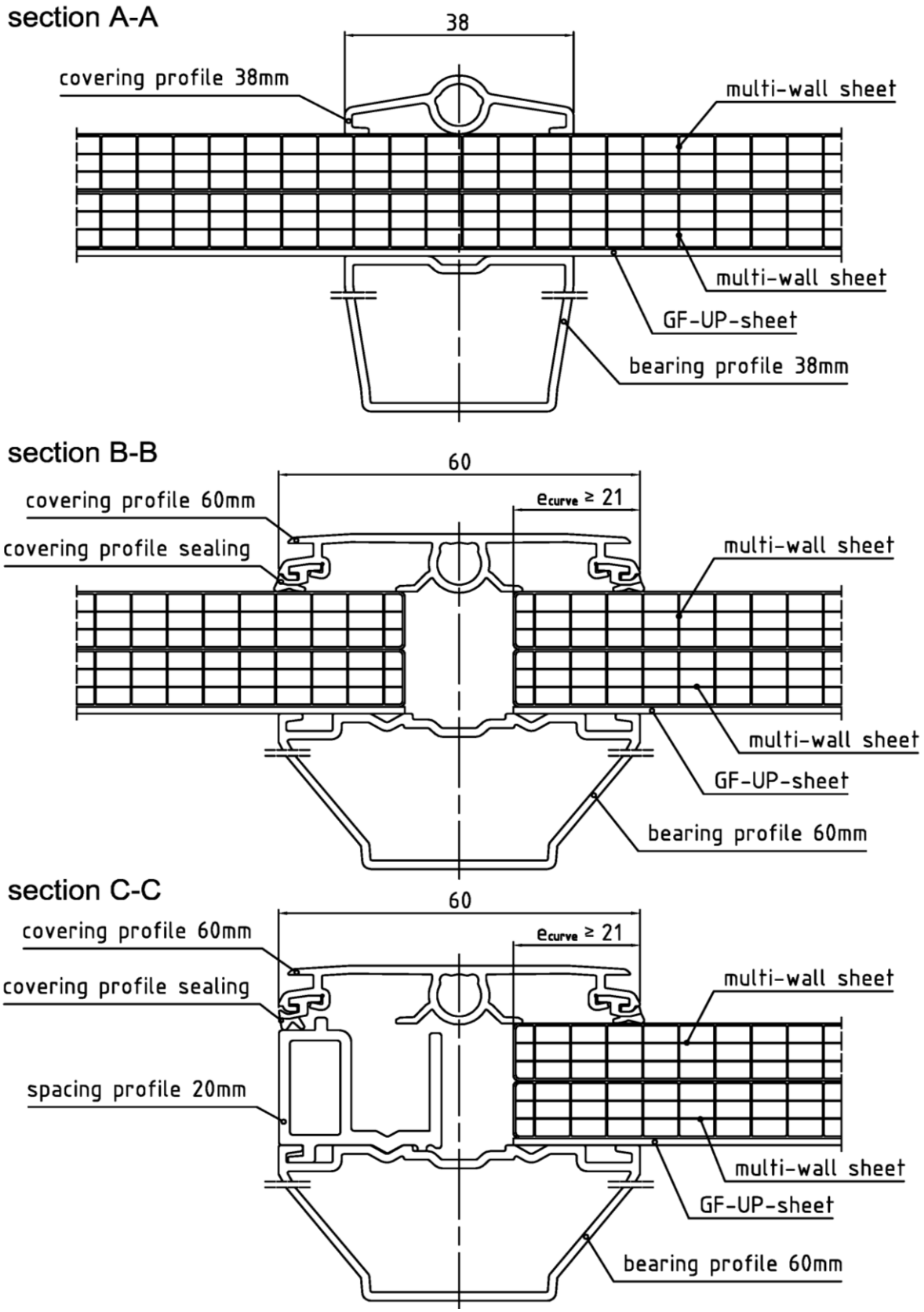

LAMILUX CI-System Lichtband B	Annex A 2.7.1
Sectional views Covering type "PC10 + PC10 + GFUP" Section A-A; section B-B; section C-C	

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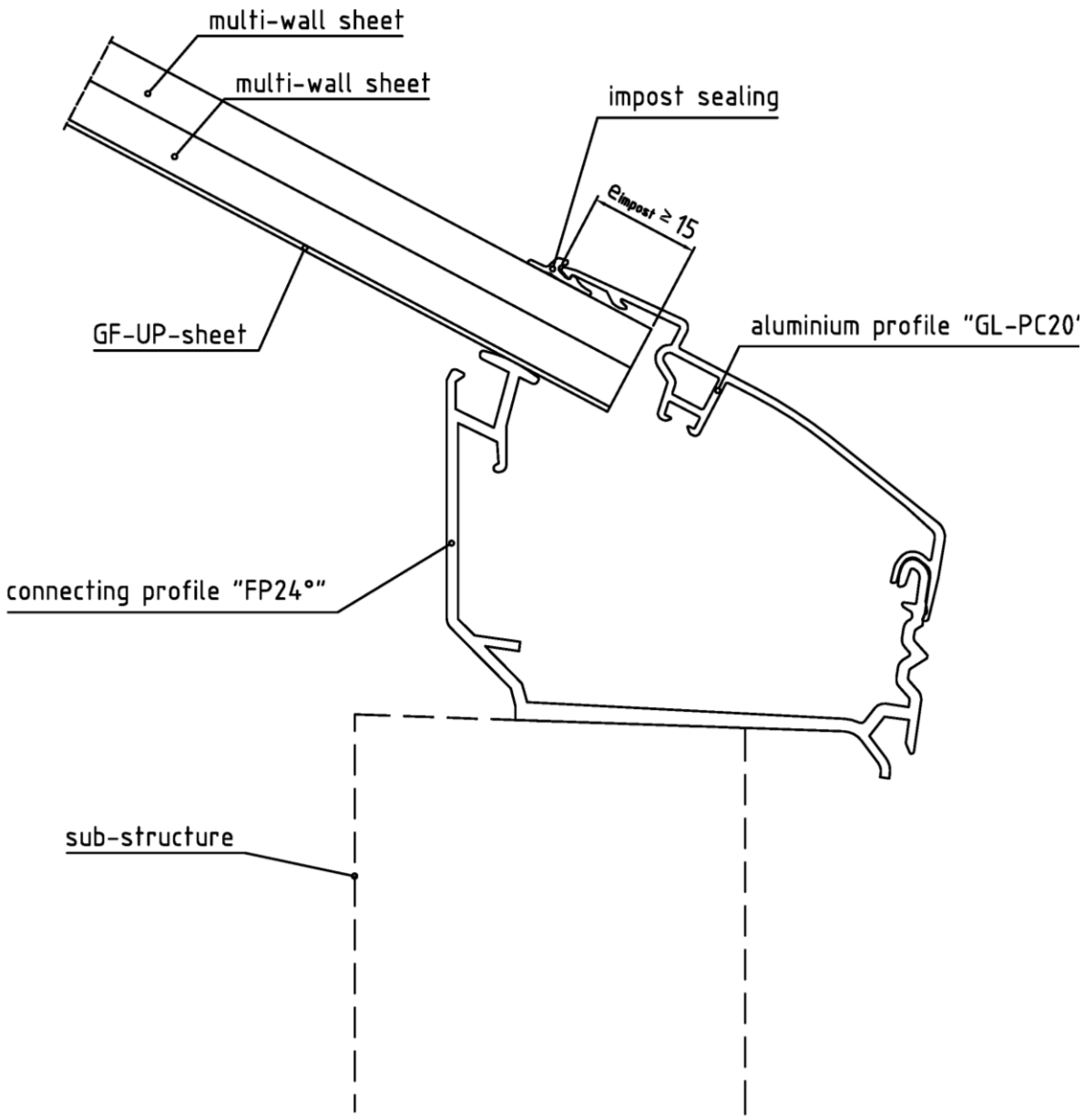
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.7.2
Sectional views Covering type "PC10 + PC10 + GFUP" Section D-D	

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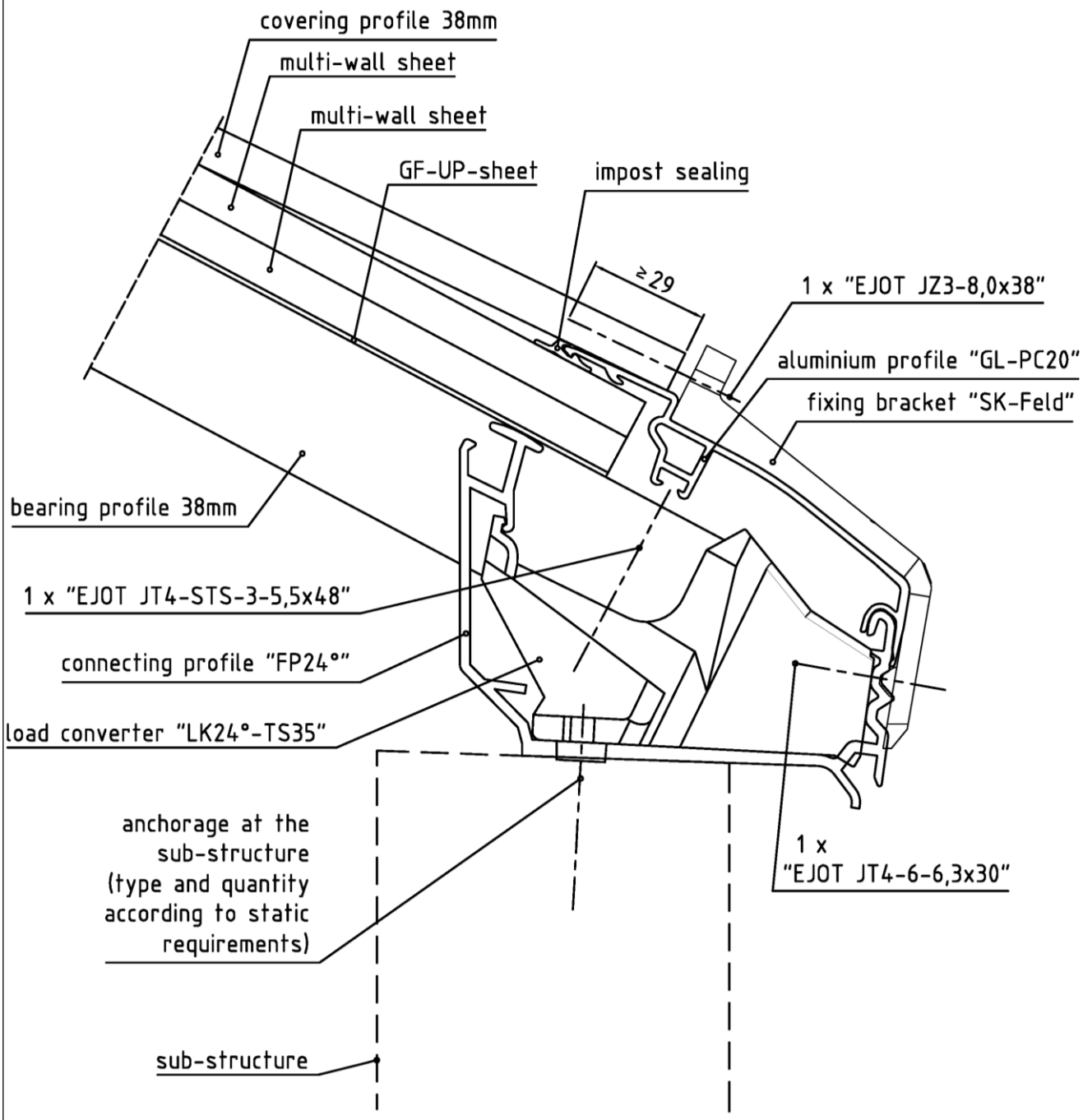
section E-E



LAMILUX CI-System Lichtband B	Annex A 2.7.3
Sectional views Covering type "PC10 + PC10 + GFUP" Section E-E	

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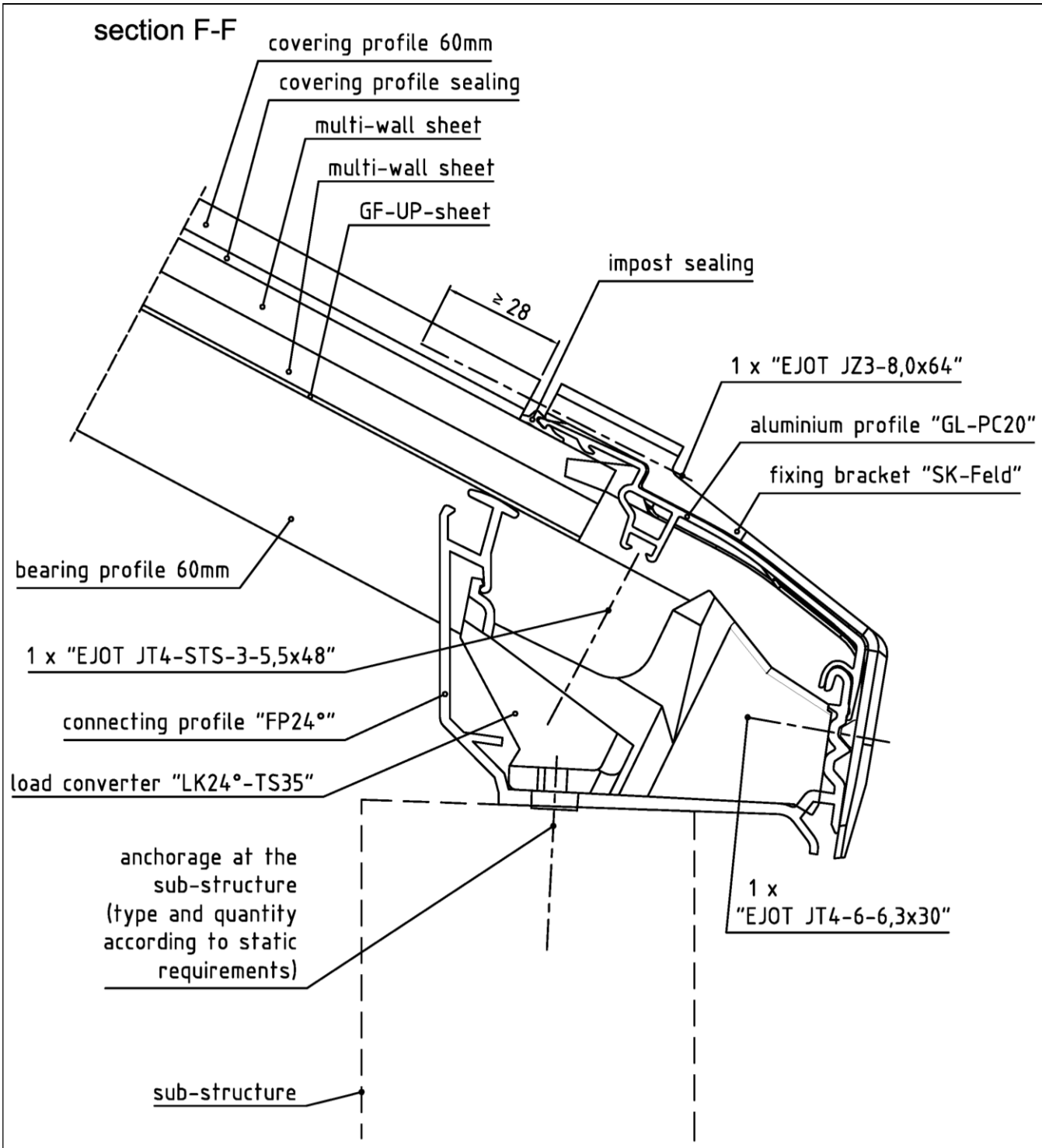
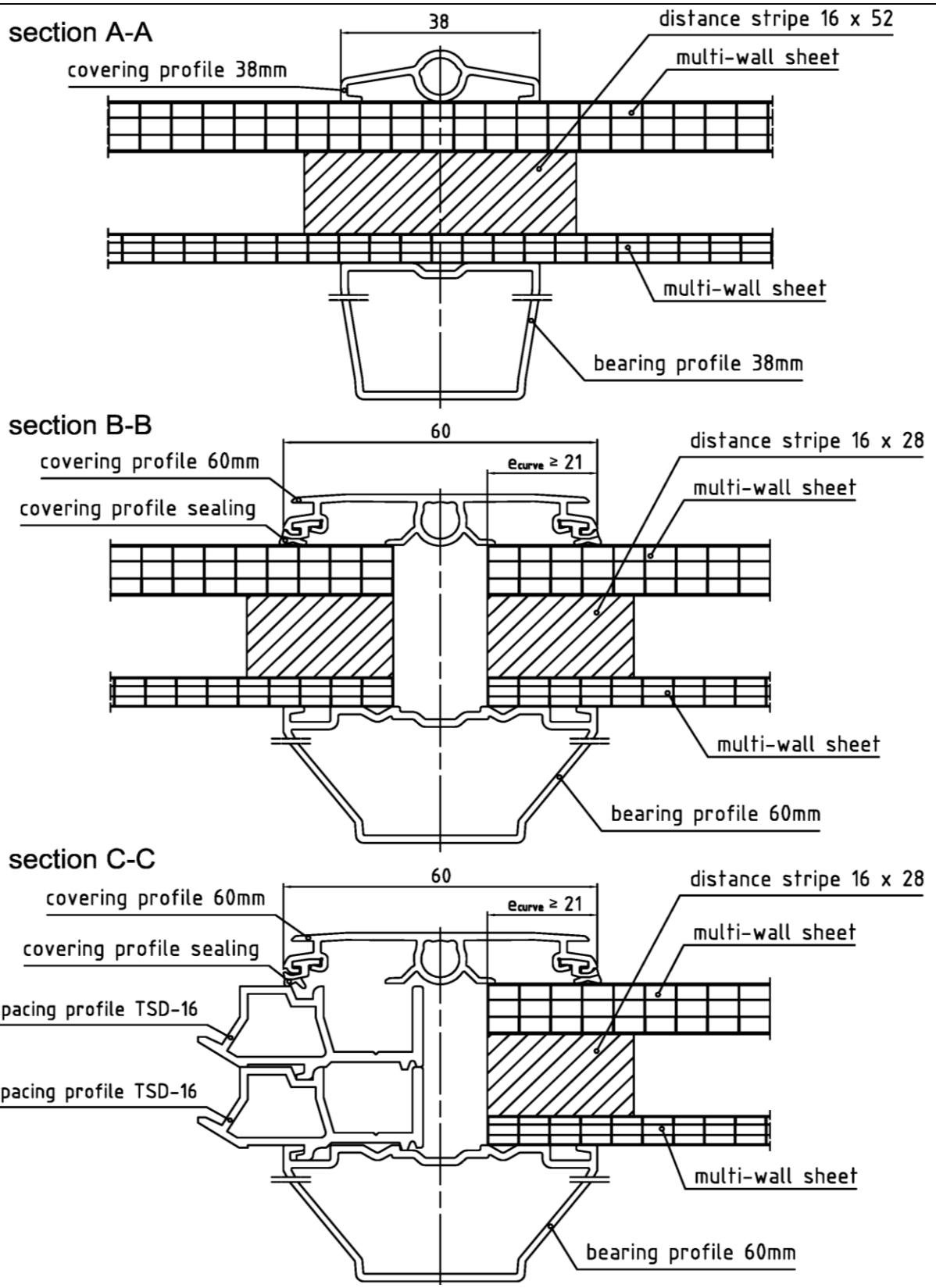


LAMILUX CI-System Lichtband B	Annex A 2.7.4
Sectional views Covering type "PC10 + PC10 + GFUP" Section F-F	

Deutsches Institut für Bautechnik DIBt



LAMILUX CI-System Lichtband B	Annex A 2.8.1
Sectional views Covering type "PC10 + PC16 tc 16" Section A-A; section B-B; section C-C	

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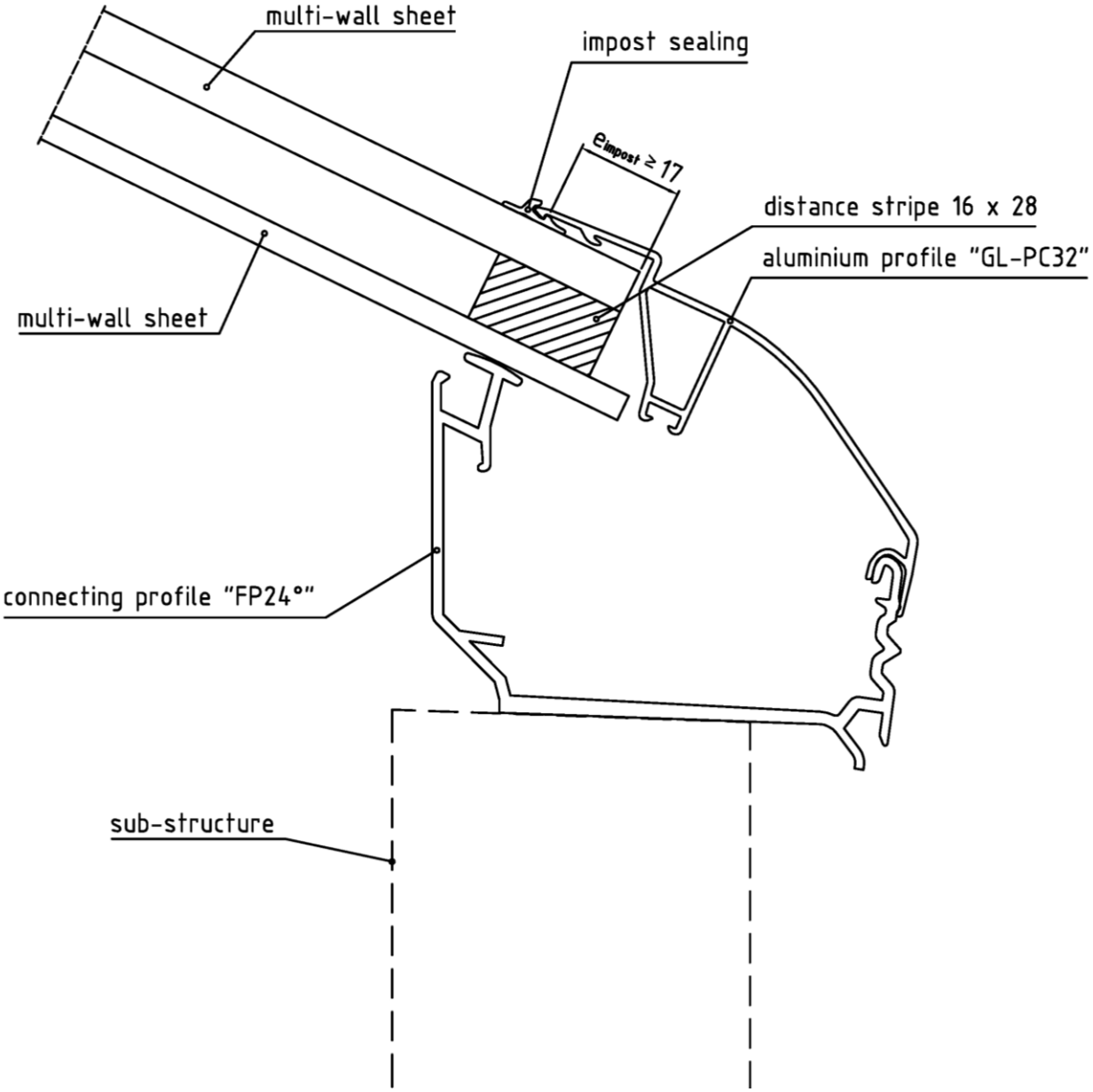
section D-D



LAMILUX CI-System Lichtband B	Annex A 2.8.2
Sectional views Covering type "PC10 + PC16 tc 16" Section D-D	

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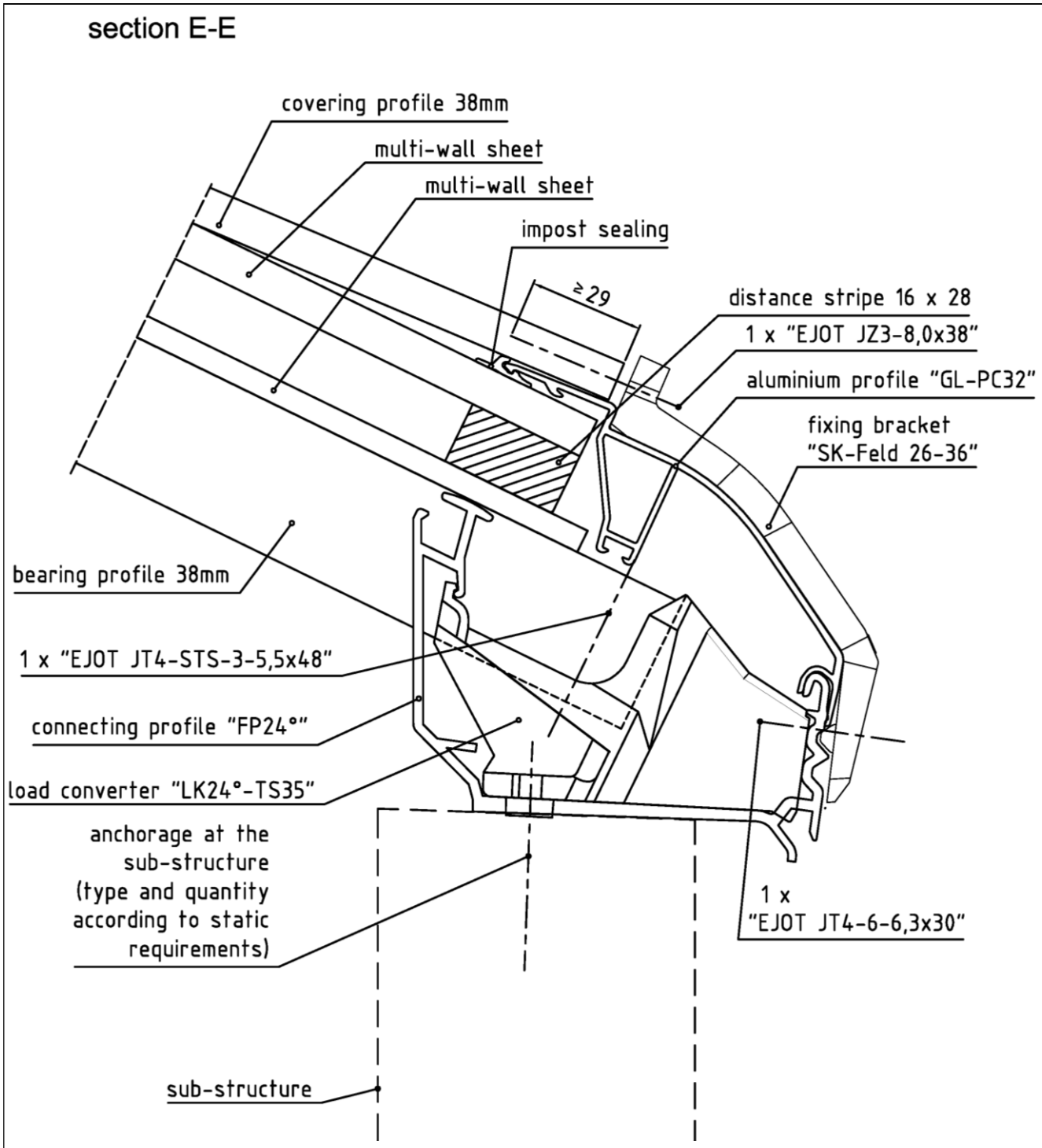

LAMILUX CI-System Lichtband B	Annex A 2.8.3
Sectional views Covering type "PC10 + PC16 tc 16" Section E-E	

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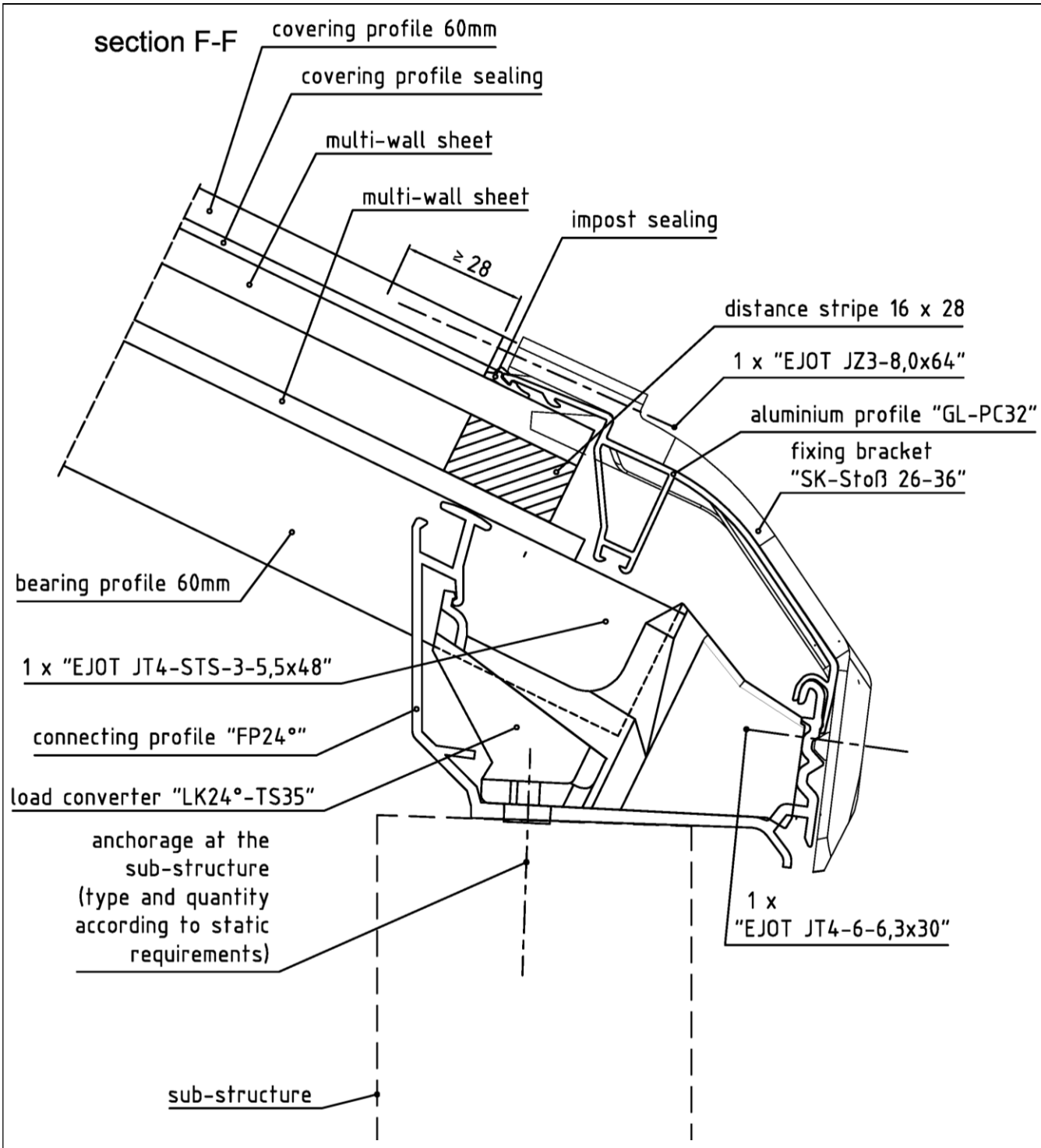

LAMILUX CI-System Lichtband B	Annex A 2.8.4
Sectional views Covering type "PC10 + PC16 tc 16" Section F-F	

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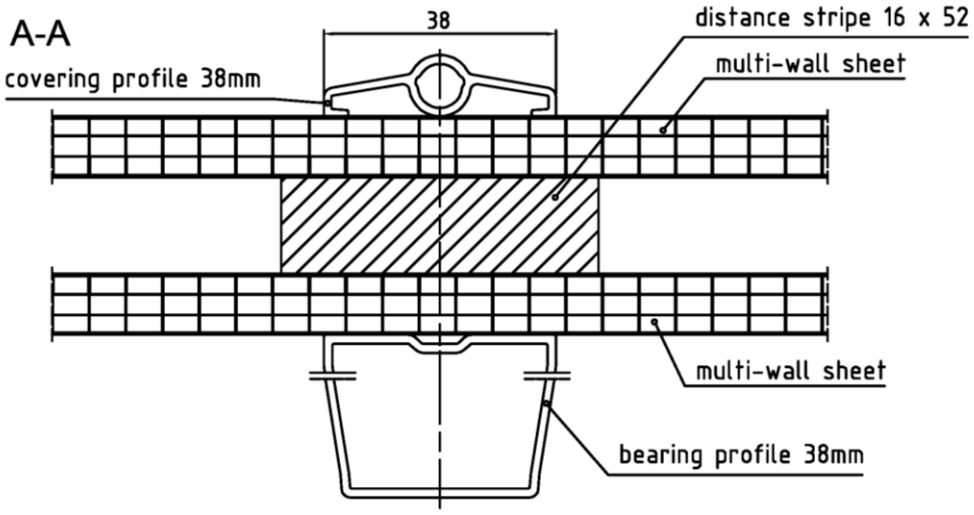
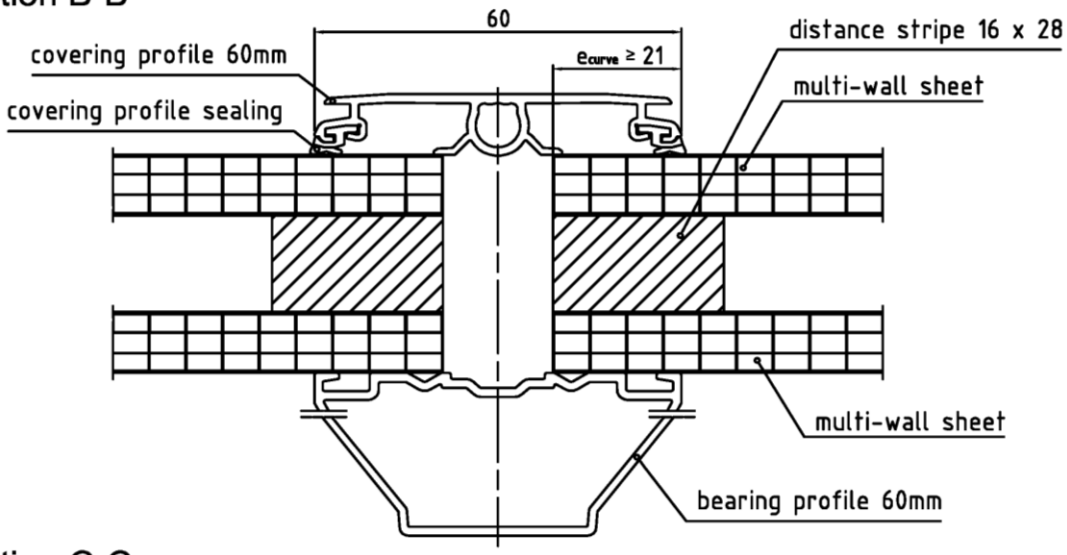
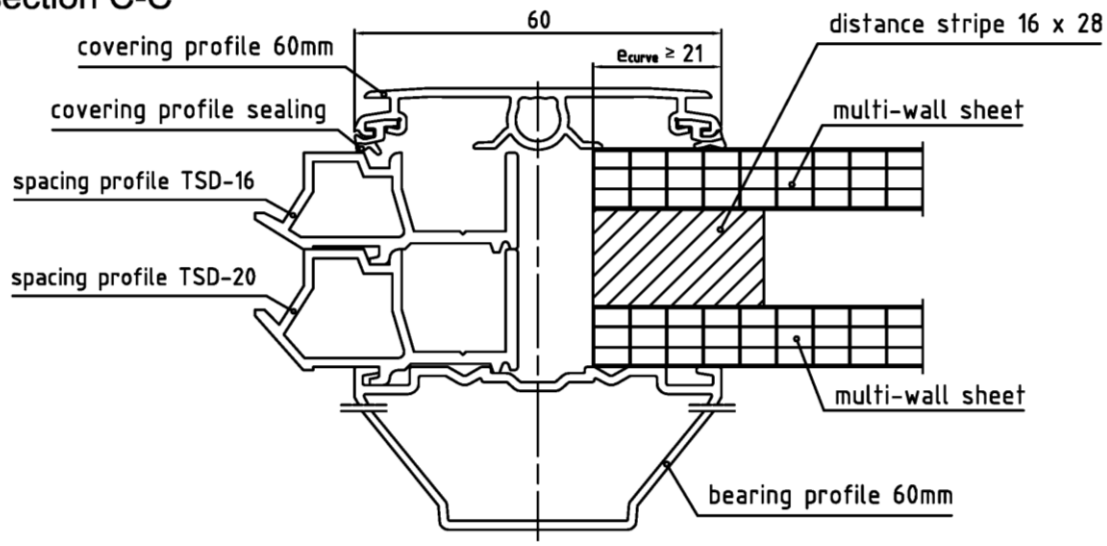
section A-A



section B-B



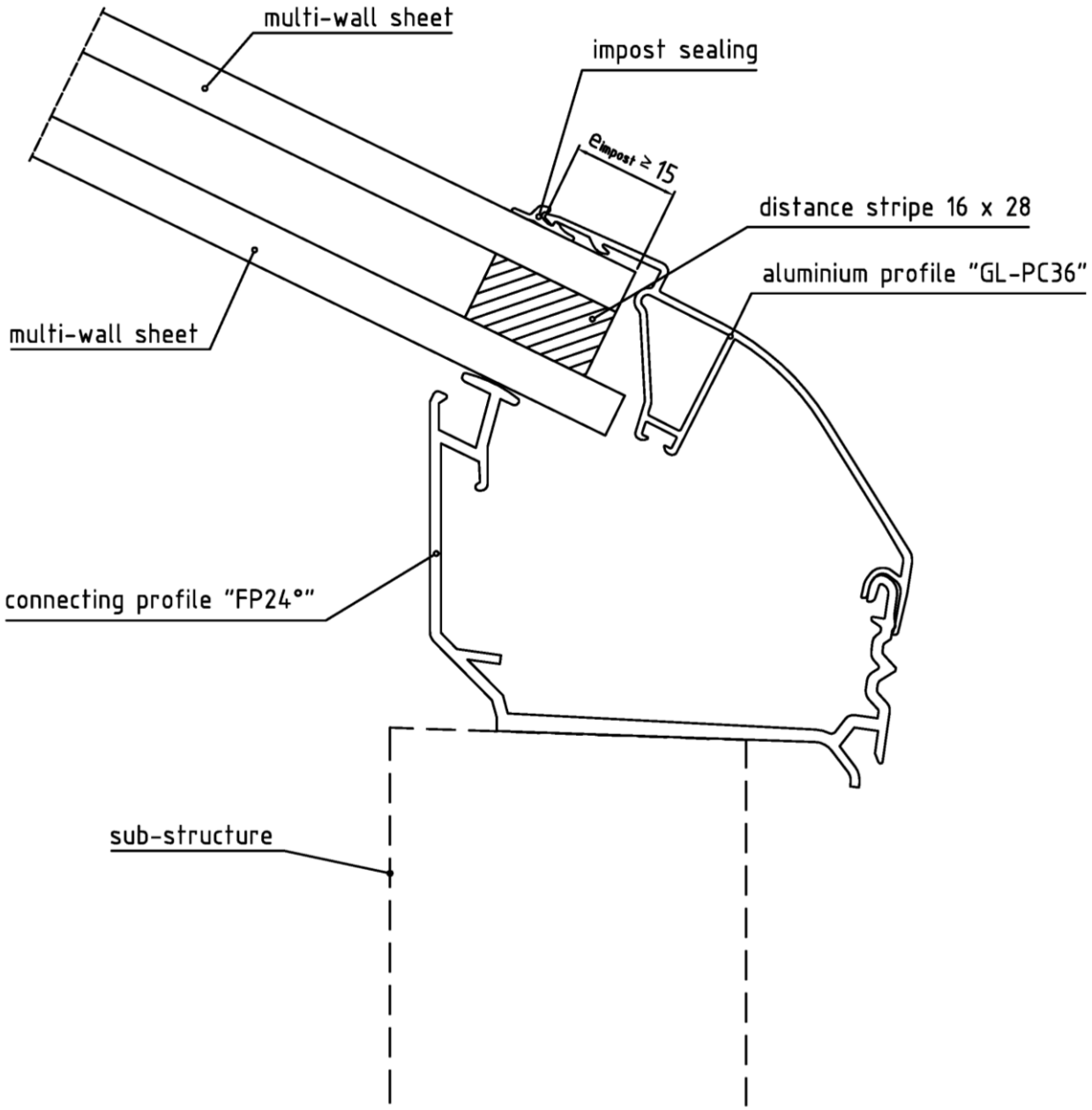
section C-C



LAMILUX CI-System Lichtband B	Annex A 2.9.1
Sectional views Covering type "PC10 + PC10 tc 16" Section A-A; section B-B; section C-C	

Deutsches Institut für Bautechnik DIBt

section D-D



LAMILUX CI-System Lichtband B	Annex A 2.9.2
Sectional views Covering type "PC10 + PC10 tc 16" Section D-D	

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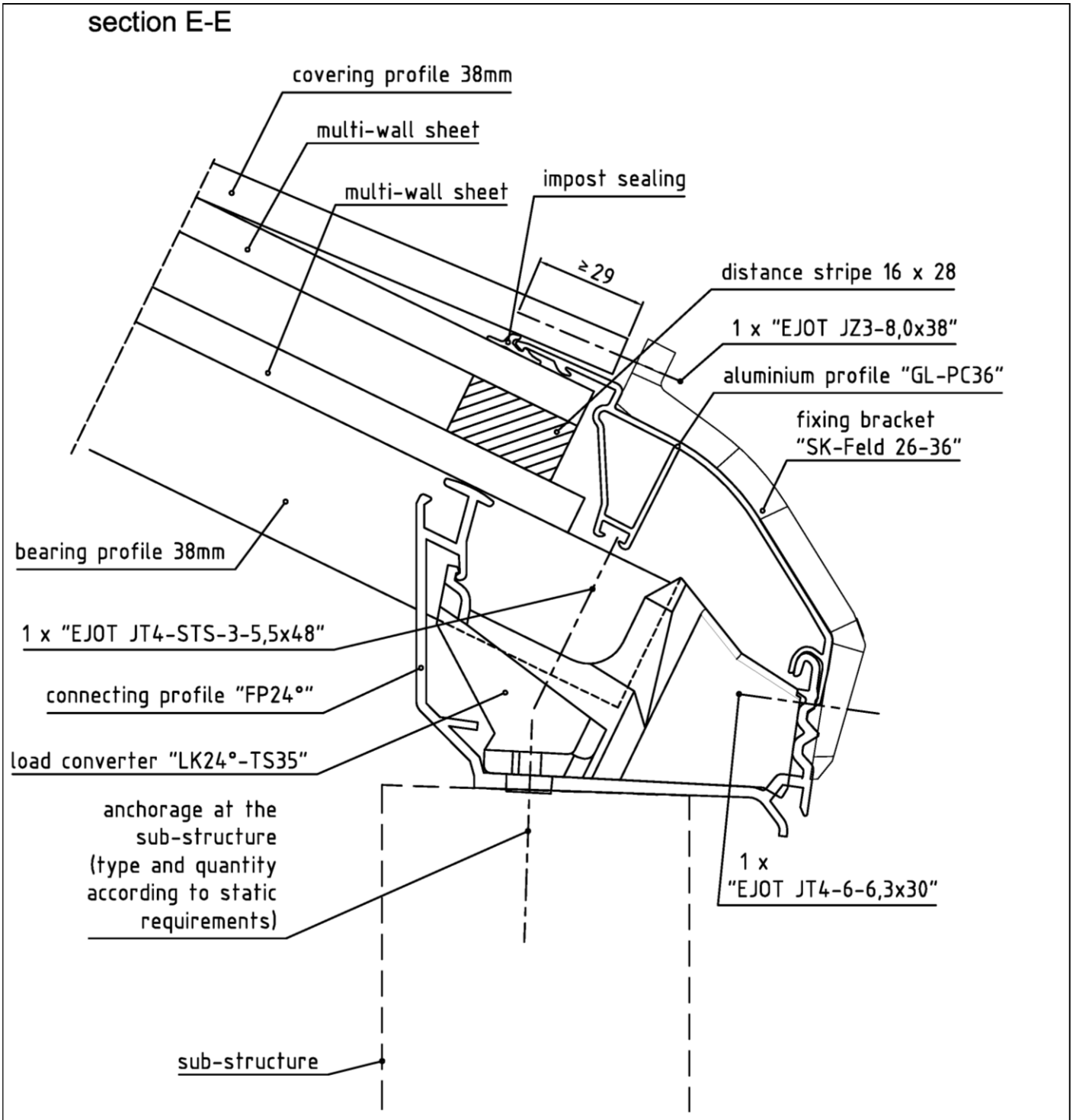

LAMILUX CI-System Lichtband B	Annex A 2.9.3
Sectional views Covering type "PC10 + PC10 tc 16" Section E-E	

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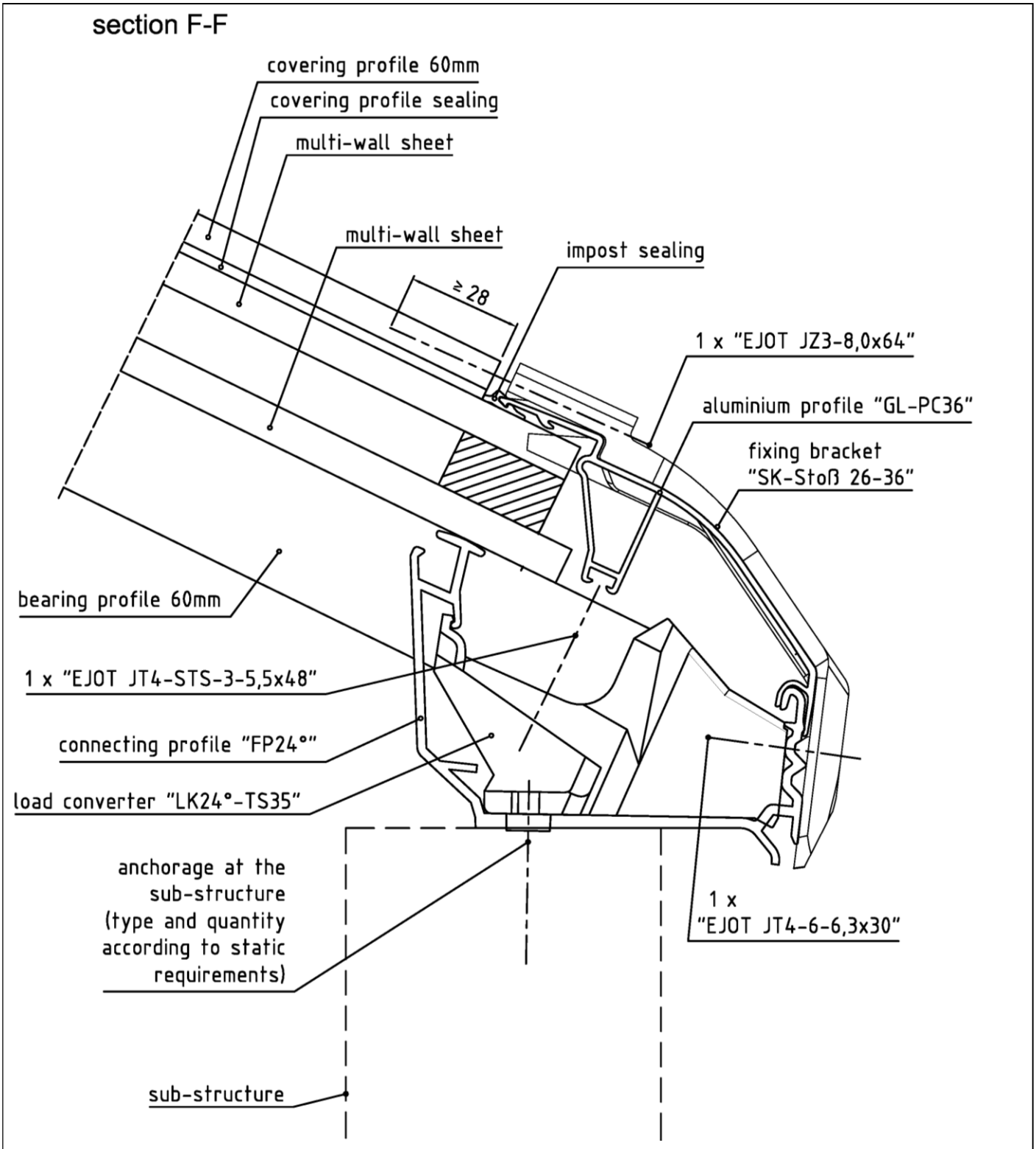

LAMILUX CI-System Lichtband B	Annex A 2.9.4
Sectional views Covering type "PC10 + PC10 tc 16" Section F-F	

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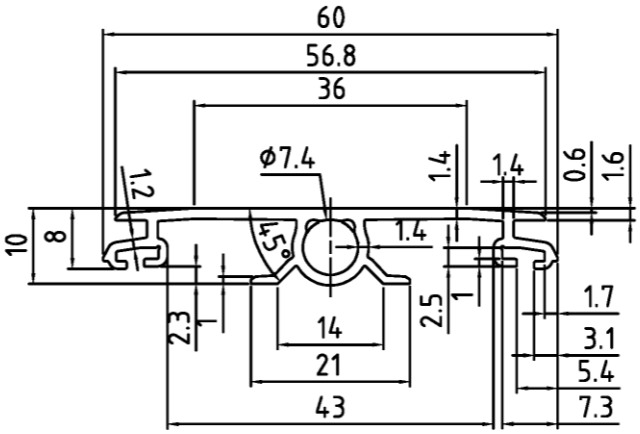
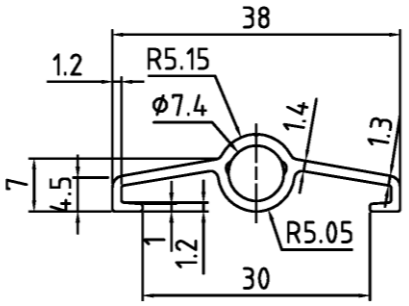
covering profile 60mm



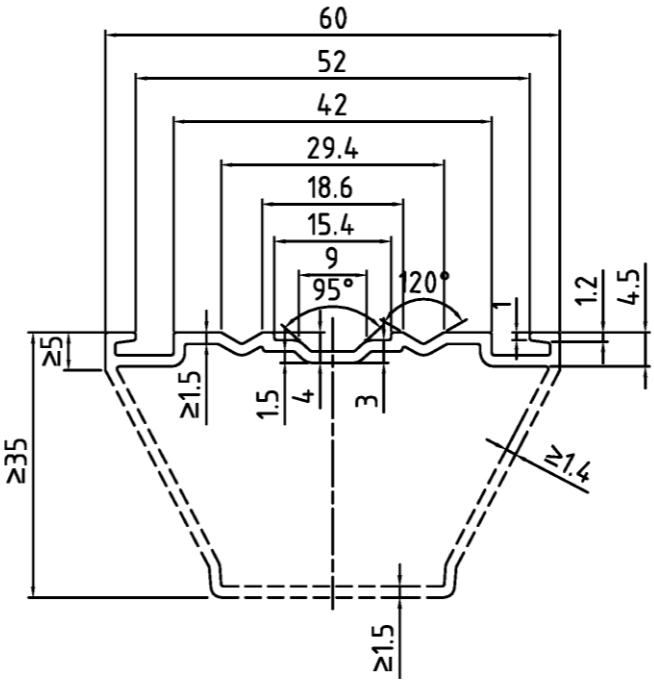
EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

covering profile 38mm



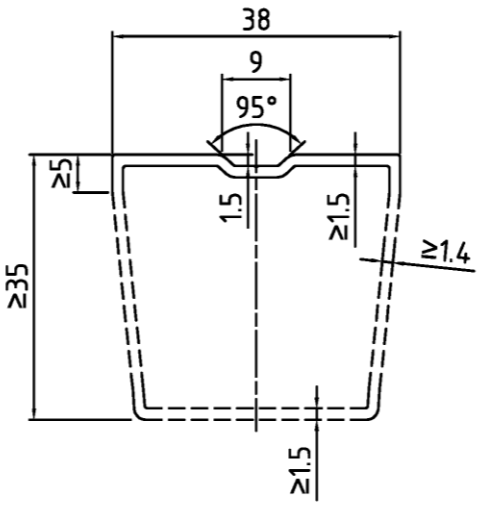
EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

bearing profile 60mm



EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

bearing profile 38mm



EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

LAMILUX CI-System Lichtband B	Annex A 3.1
Components Covering profile 60mm; covering profile 38mm Bearing profile 60mm; bearing profile 38mm	

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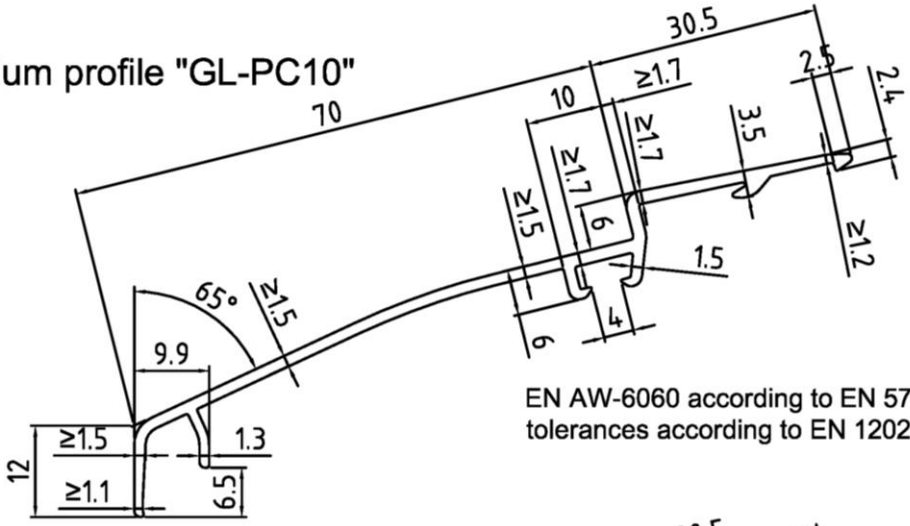
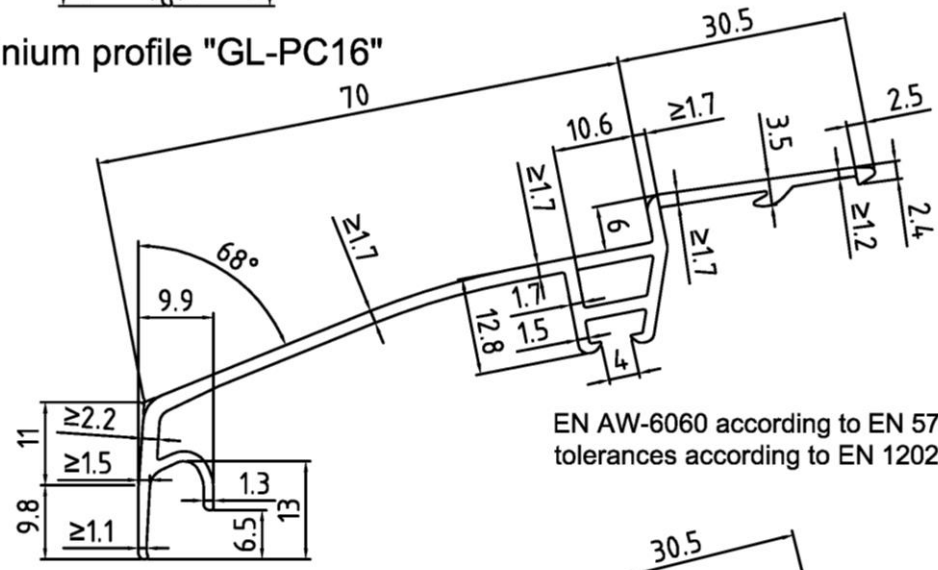
aluminium profile "GL-PC10"



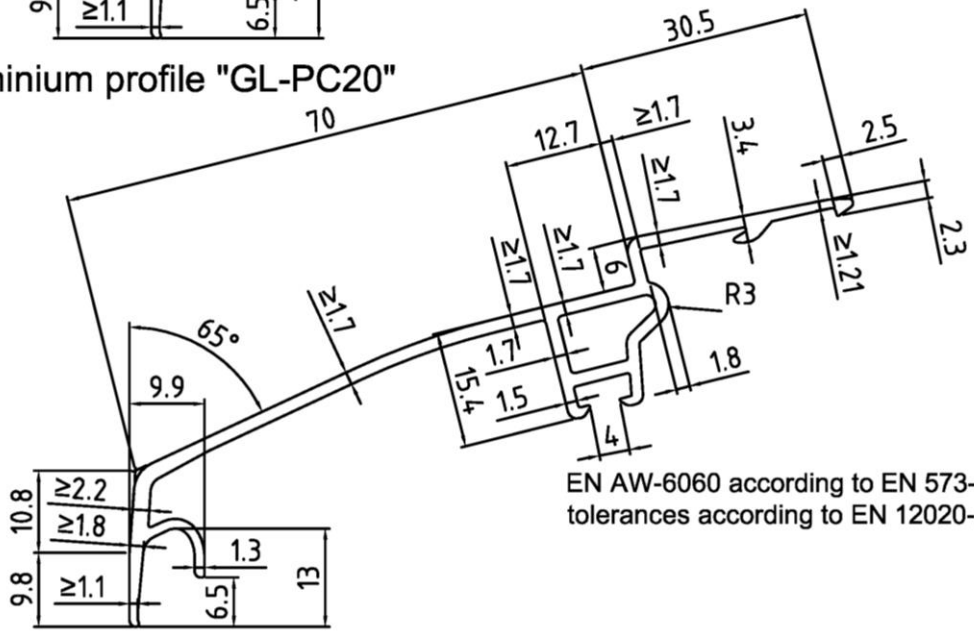
EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

aluminium profile "GL-PC16"



EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

aluminium profile "GL-PC20"

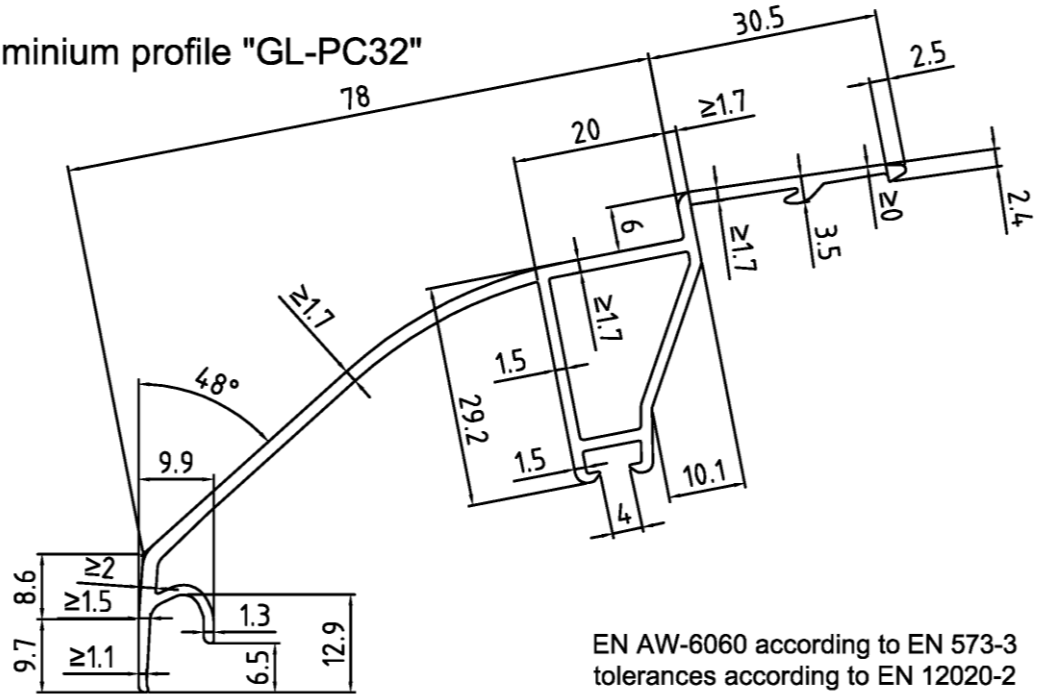


EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

LAMILUX CI-System Lichtband B	Annex A 3.2
Components Aluminium profiles "GL-PC10"; "GL-PC16"; "GL-PC20"	

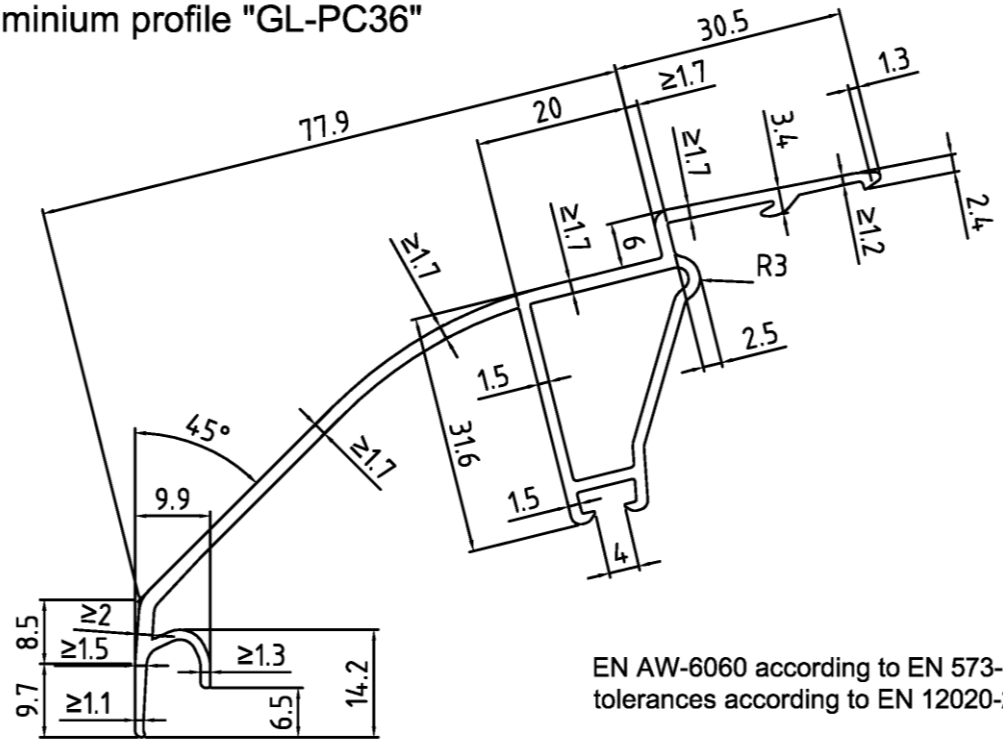
Deutsches Institut für Bautechnik DIBt

aluminium profile "GL-PC32"



EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

aluminium profile "GL-PC36"

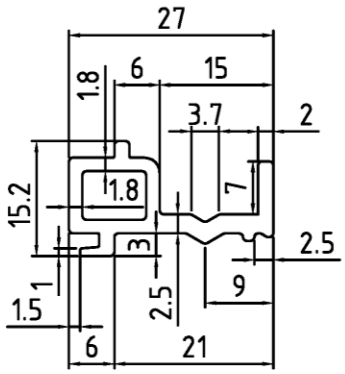


EN AW-6060 according to EN 573-3
tolerances according to EN 12020-2

LAMILUX CI-System Lichtband B	Annex A 3.3
Components Aluminium profiles "GL-PC32"; "GL-PC36"	

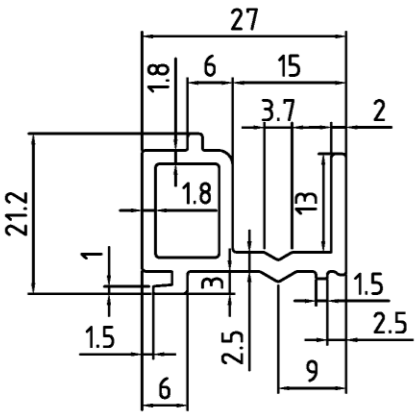
Deutsches Institut für Bautechnik DIBt

spacing profile 10mm



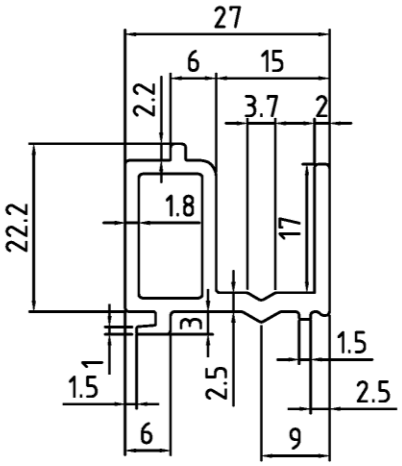
PVC-U; E G L, 078 - 25 - T33
according to EN ISO 1163

spacing profile 16mm



PVC-U; E G L, 078 - 25 - T33
according to EN ISO 1163

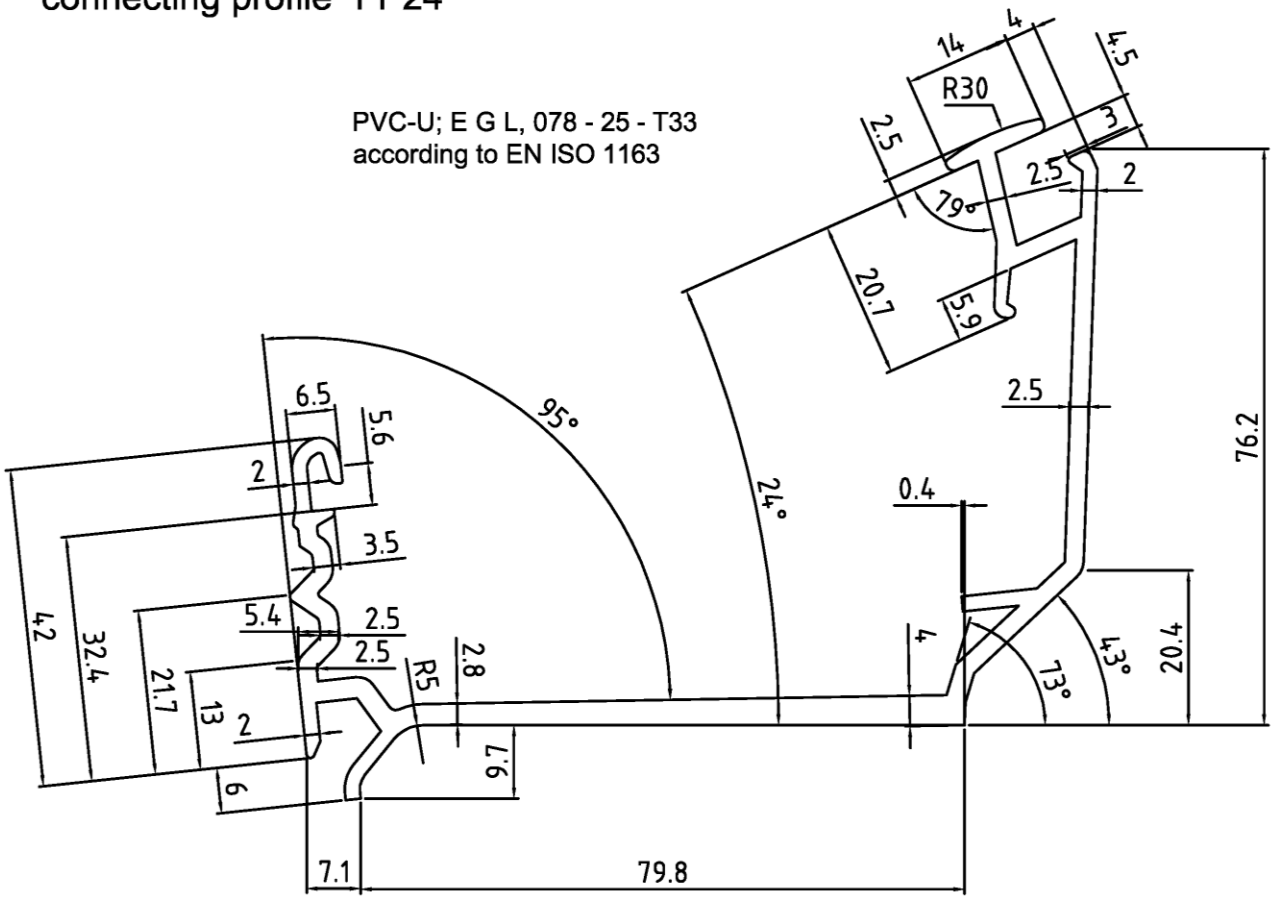
spacing profile 20mm



PVC-U; E G L, 078 - 25 - T33
according to EN ISO 1163

connecting profile "FP24°"

PVC-U; E G L, 078 - 25 - T33
according to EN ISO 1163



LAMILUX CI-System Lichtband B	Annex A 3.4
Components Spacing profiles 10mm; 16mm; 20mm Connecting profile "FP24"	

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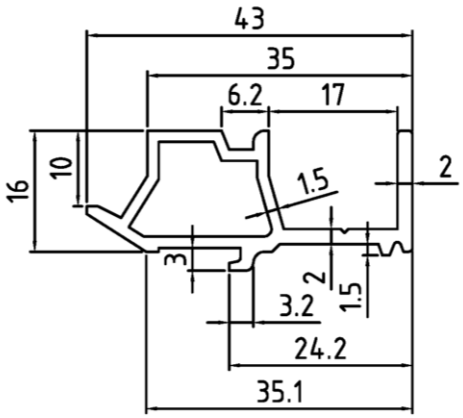
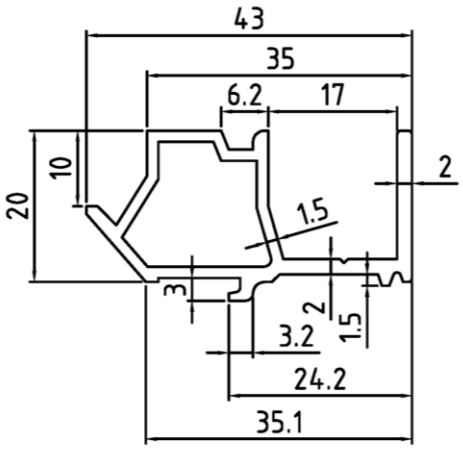
spacing profile TSD-16



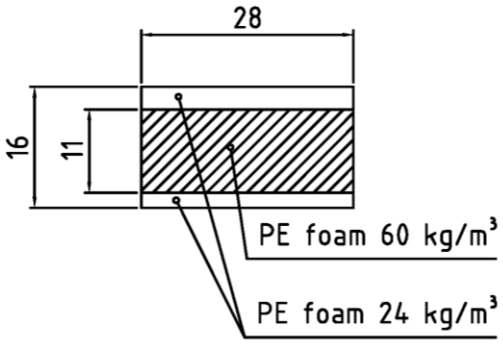
PVC-U; E G L, 078 - 25 - T33
according to EN ISO 1163

spacing profile TSD-20



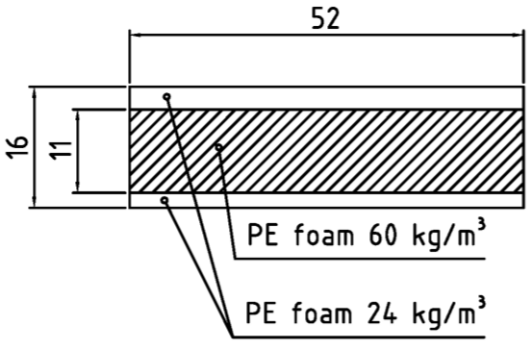
PVC-U; E G L, 078 - 25 - T33
according to EN ISO 1163

distance stripe 16 x 28



PE-foam according to EN ISO 7214

distance stripe 16 x 52



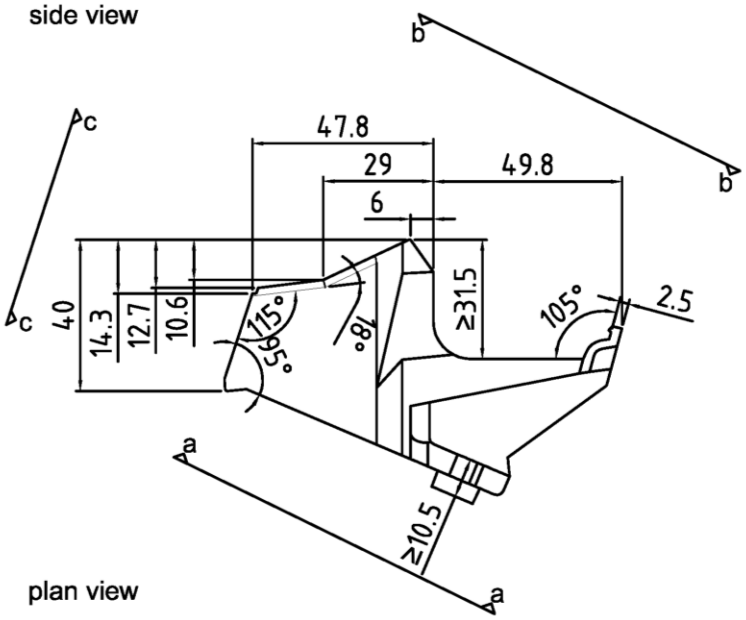
PE-foam according to EN ISO 7214

LAMILUX CI-System Lichtband B	
Components Spacing profiles TSD-16; TSD-20 Distance stripe 16 x 28; 16x 52	Annex A 3.5

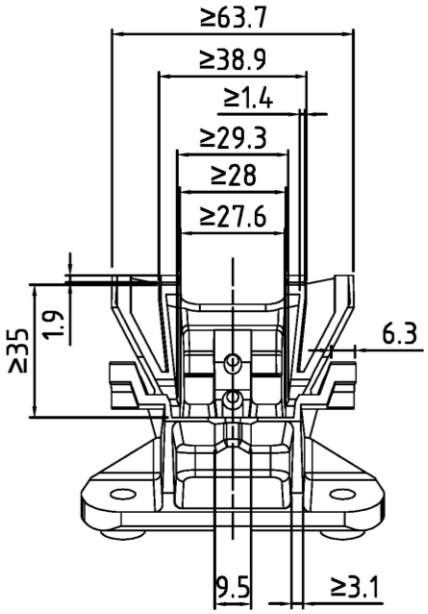
Deutsches Institut für Bautechnik DIBt

load converter "LK24°-TS35"

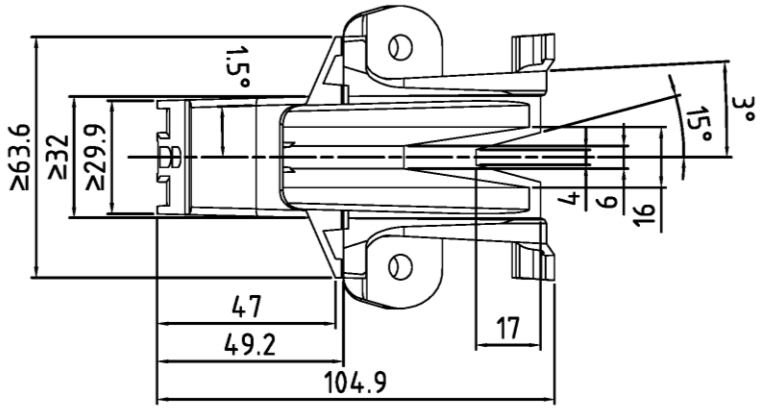
side view



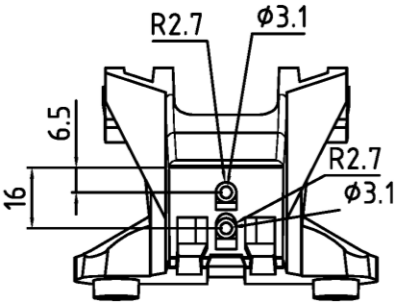
front view



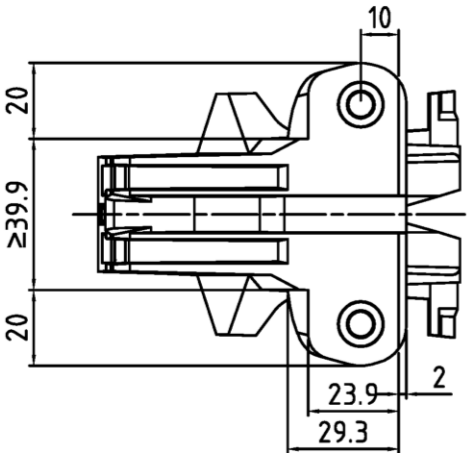
plan view



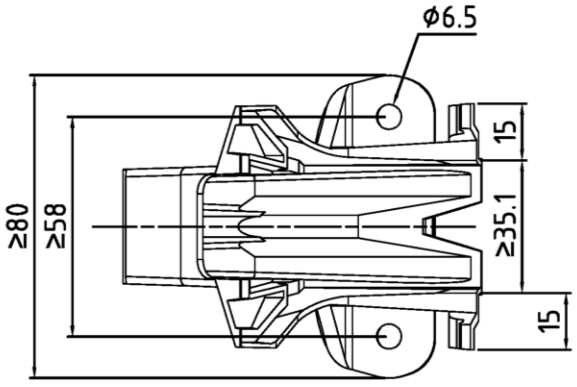
view c-c



view a-a



view b-b



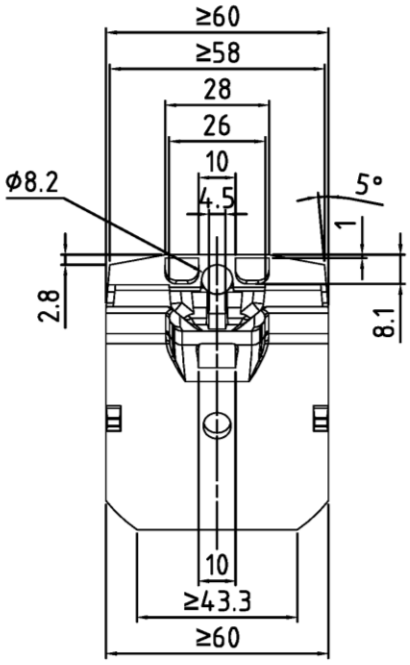
EN AC-44200 according to EN 1706

LAMILUX CI-System Lichtband B	Annex A 3.6
Components Load converter "LK24-TS35"	

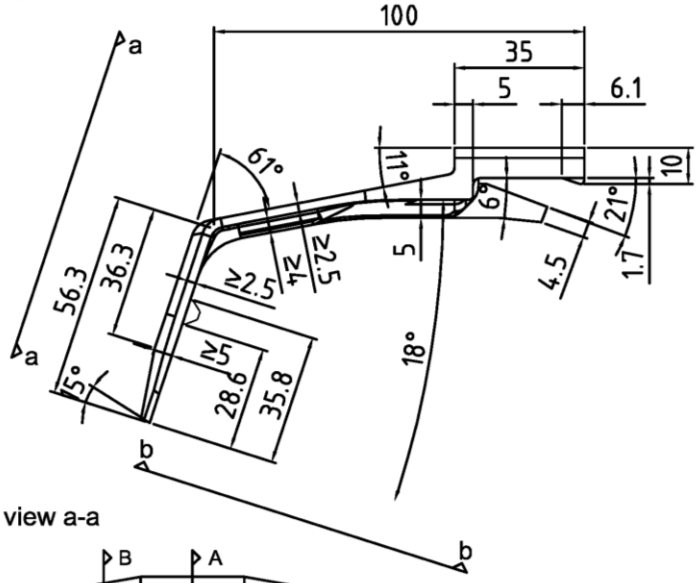
Deutsches Institut für Bautechnik DIBt

fixing bracket "SK-Stoß"

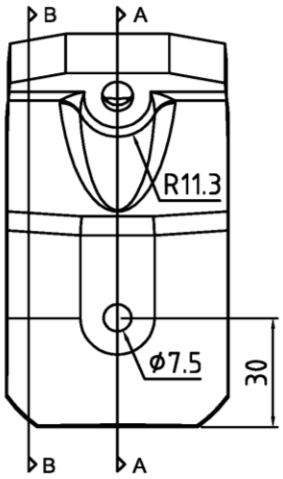
front view



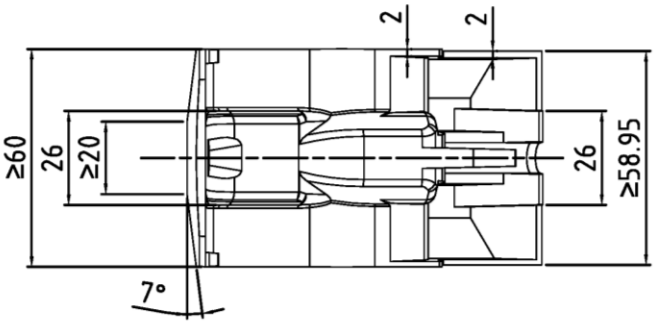
side view



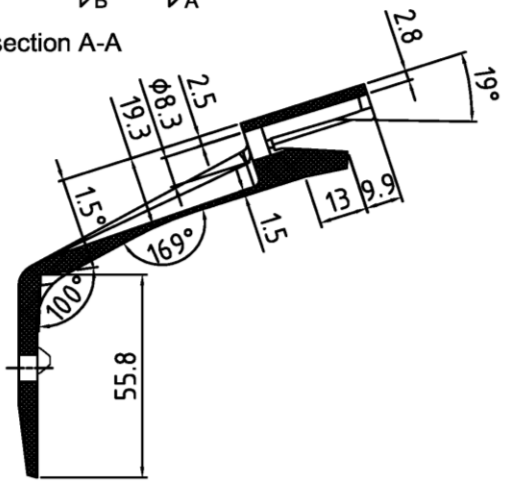
view a-a



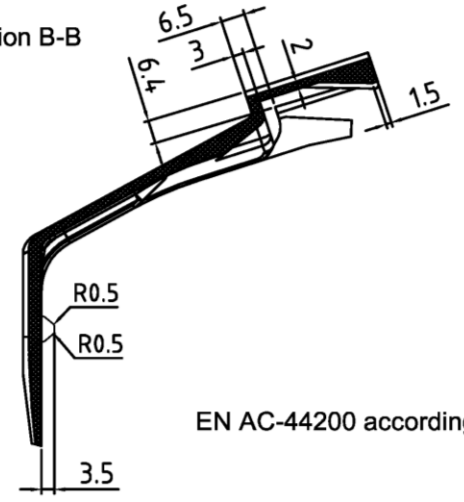
view b-b



section A-A



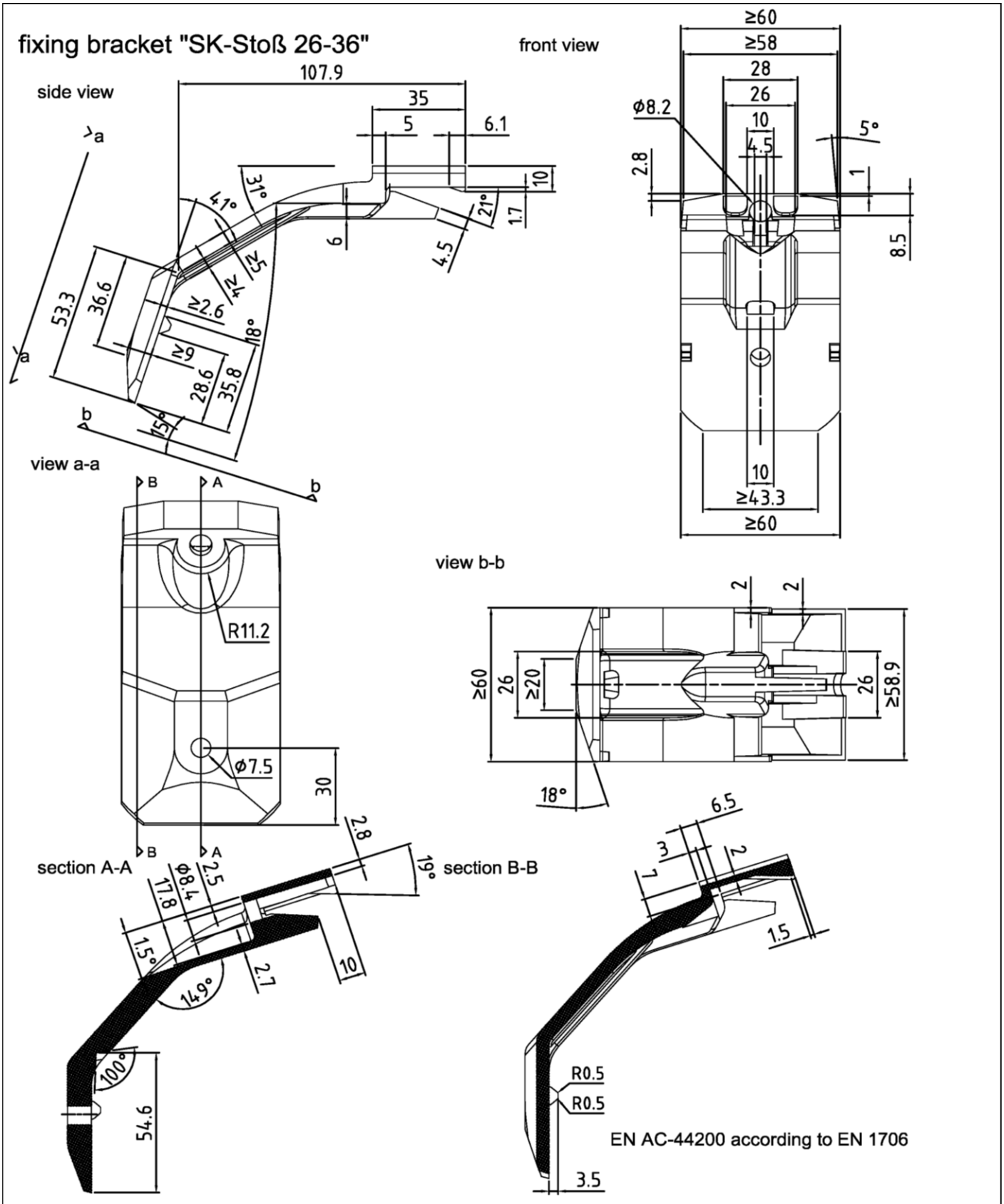
section B-B



EN AC-44200 according to EN 1706

LAMILUX CI-System Lichtband B	
Components Fixing bracket "SK Stoß"	Annex A 3.7

Deutsches Institut für Bautechnik DIBt

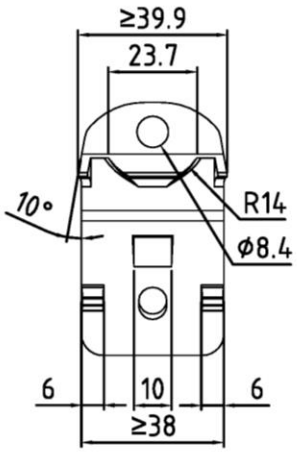


LAMILUX CI-System Lichtband B	Annex A 3.8
Components Fixing bracket "SK Stoß 26-36"	

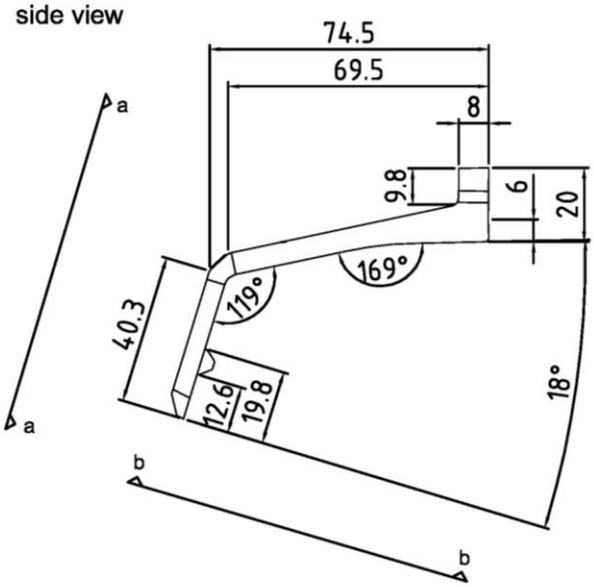
Deutsches Institut für Bautechnik DIBt

fixing bracket "SK-Feld"

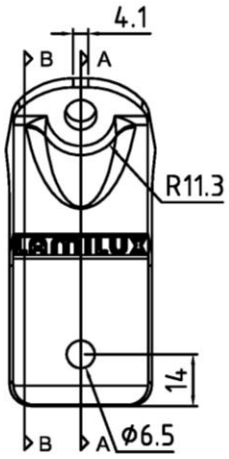
front view



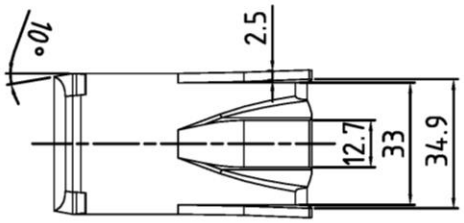
side view



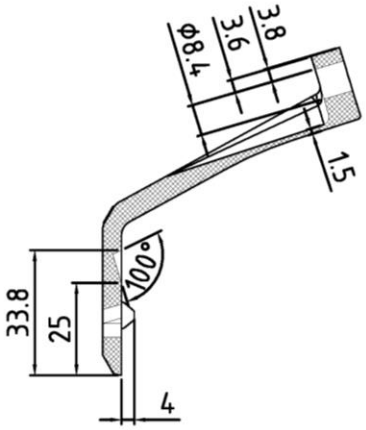
view a-a



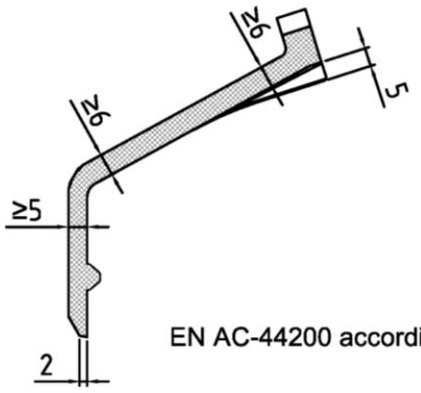
view b-b



section A-A



section B-B

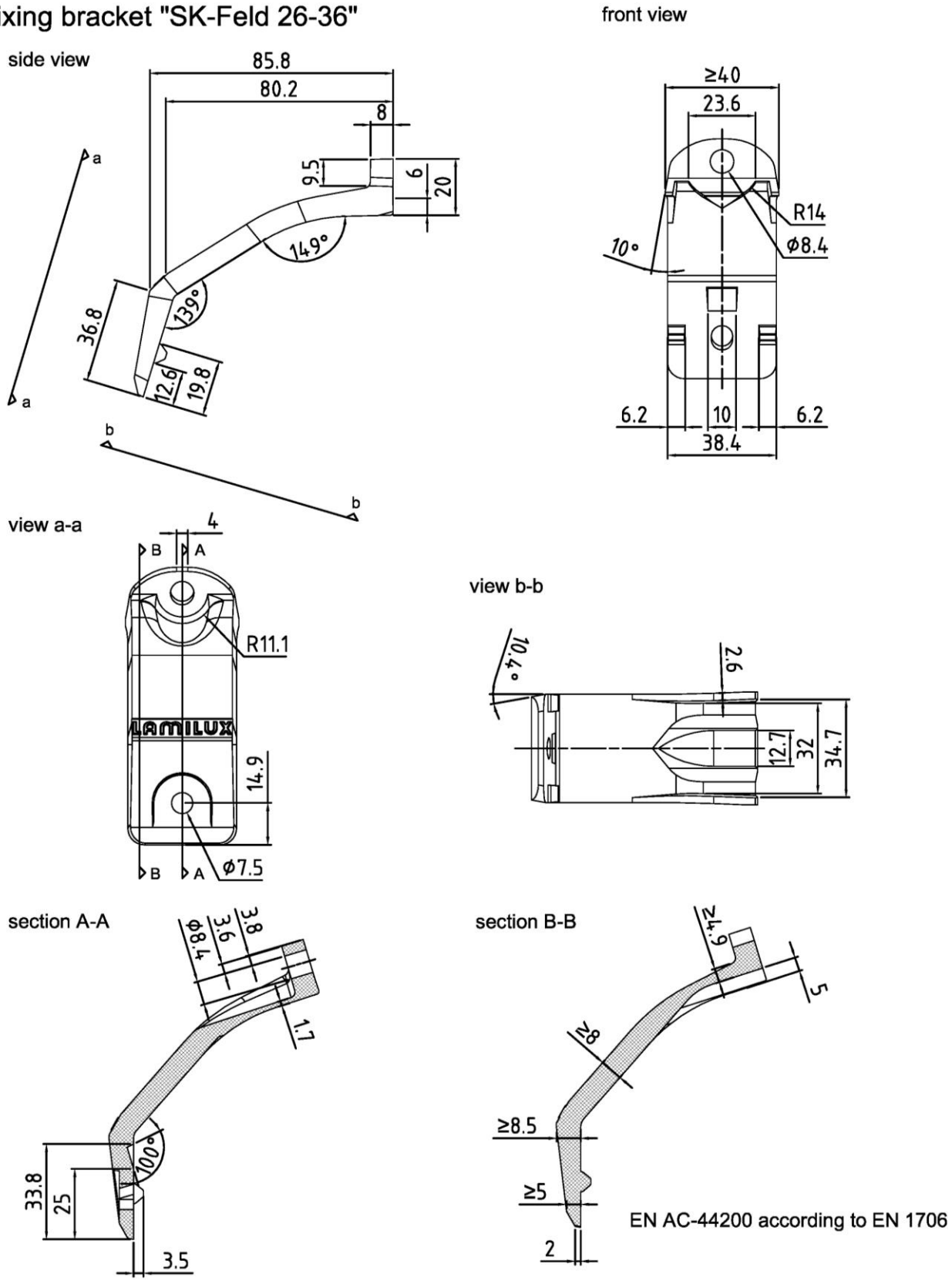


EN AC-44200 according to EN 1706

LAMILUX CI-System Lichtband B	Annex A 3.9
Components Fixing bracket "SK Feld"	

Deutsches Institut für Bautechnik DIBt

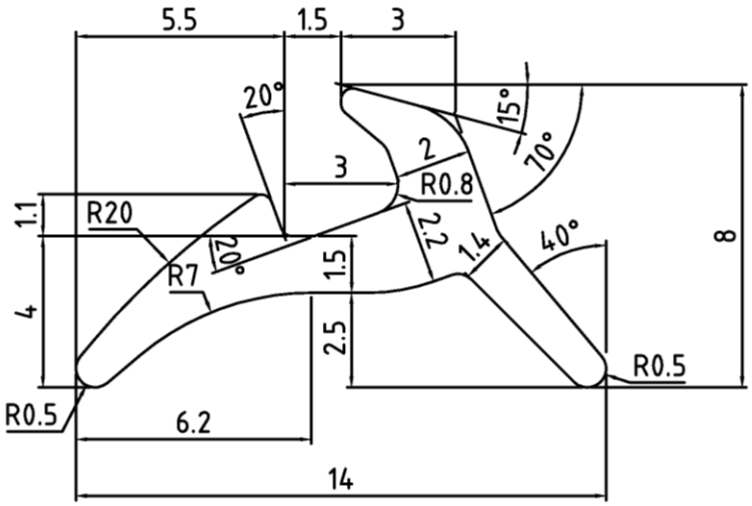
fixing bracket "SK-Feld 26-36"



LAMILUX CI-System Lichtband B	Annex A 3.10
Components Fixing bracket "SK Feld 26-36"	

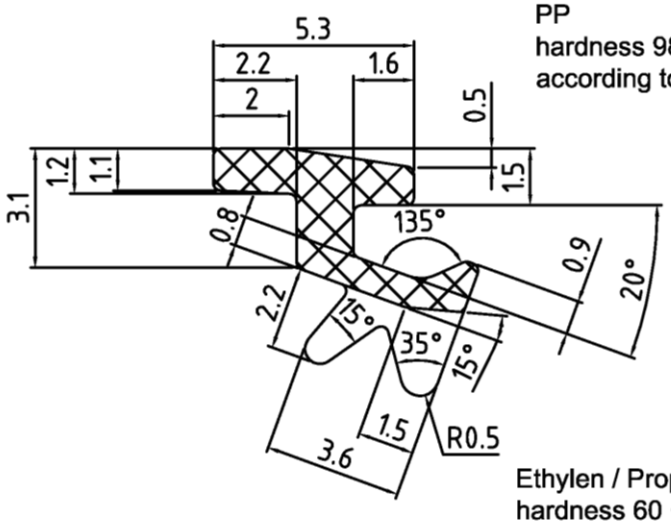
Deutsches Institut für Bautechnik DIBt

eaves sealing



EPDM
hardness 80 +/-5 Shore A
according to EN ISO 868

covering profile sealing



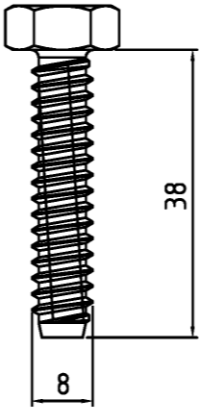
PP
hardness 98 +/-5 Shore A
according to EN ISO 868

Ethylen / Propylen - Terpolymer EPDM
hardness 60 +/-5 Shore A
according to EN ISO 868

LAMILUX CI-System Lichtband B	Annex A 3.11
Components Eaves sealing; covering profile sealing	

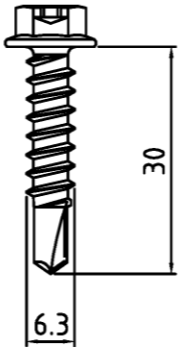
Deutsches Institut für Bautechnik DIBt

self-tapping screw "EJOT JZ3-8,0x38"



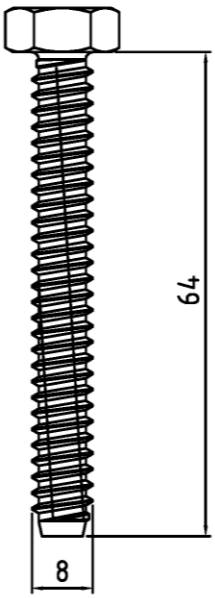
EN 10088 material number 1.4301
actuation: hexangon head 13mm

drilling screw "EJOT JT4-6-6,3x30"



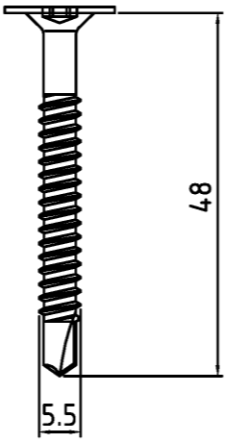
EN 10088 material number 1.4301
actuation: Torx TX 25
drilling capacity 6mm

self-tapping screw "EJOT JZ3-8,0x64"



EN 10088 material number 1.4301
actuation: hexagon head 13mm

drilling screw "EJOT JT4-STS-3-5,5x48"



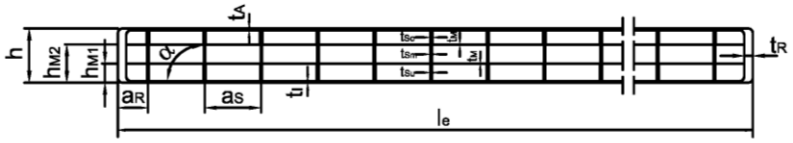
EN 10088 material number 1.4301
actuation: Torx TX 25
drilling capacity 3mm

LAMILUX CI-System Lichtband B	Annex A 3.12
Components Drilling screw Self-tapping scew	

Deutsches Institut für Bautechnik DIBt

sheets description:	Lamilux PC 4/6
sheets manufracturer:	Bayer Sheet Europe GmbH
moulding composition:	ISO 7391 - PC, EL, 61-03-9
Nominal weight:	0,95 kg/m²

dimensions and tolerances



le [mm]	as [mm]	aR [mm]	h [mm]	hM1 [mm]	hM2 [mm]	tA [mm]	tI [mm]
2100	6,0	3,8	5,8	2,1	4,0	0,21	0,20

tSo [mm]	tSm [mm]	tSu [mm]	tM [mm]	tR [mm]	α [°]	kg/m²
0,22	0,15	0,19	0,03	0,67	86 - 94	≥ 0,92

from the declaration of performence to be maintained minimums / or classes according to EN 16153

mechanical resistance (deformation behavior)				
Bx [Nm²/m]	By [Nm²/m]	Sy [Nm/m]	Mb,pos [Nm/m]	Mb,neg [Nm/m]
7,6	3,9	963	8,3	6,7

Mb,pos : Outside pressure-loaded
Mb,neg : Inside pressure-loaded

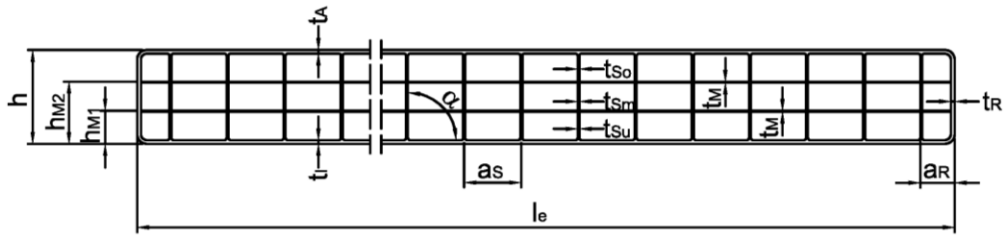
- The outside is marked by a label at the border area.

LAMILUX CI-System Lichtband B	Annex A 4.1
Components Translucent sheet Lamllux PC 4/6	

Deutsches Institut für Bautechnik DIBt

sheets description:	Makrolon multi UV 4/10-6
sheets manufracturer:	Bayer Sheet Europe GmbH
moulding composition:	ISO 7391 - PC, EL, 61-03-9
Nominal weight:	1,75 kg/m²

dimensions and tolerances



l_e [mm]	a_S [mm]	a_R [mm]	h [mm]	h_{M1} [mm]	h_{M2} [mm]	α [°]
2100	6,0	3,2	10,0	3,4	6,8	82 - 98

t_A [mm]	t_i [mm]	t_{So} [mm]	t_{Sm} [mm]	t_{Su} [mm]	t_M [mm]	t_R [mm]	kg/m²
0,44	0,44	0,20	0,16	0,23	0,08	0,26	≥ 1,71

from the declaration of performence to be maintained minimums / or classes according to EN 16153

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

$M_{b,pos}$: Outside pressure-loaded
$M_{b,neg}$: Inside pressure-loaded

Durability as change			
the yellowness index	of light transmittance	the deformation flexural modulus	the tensile strength
ΔD (≤20)	ΔD (≤10%)	Cu1	Ku1

specification of usage

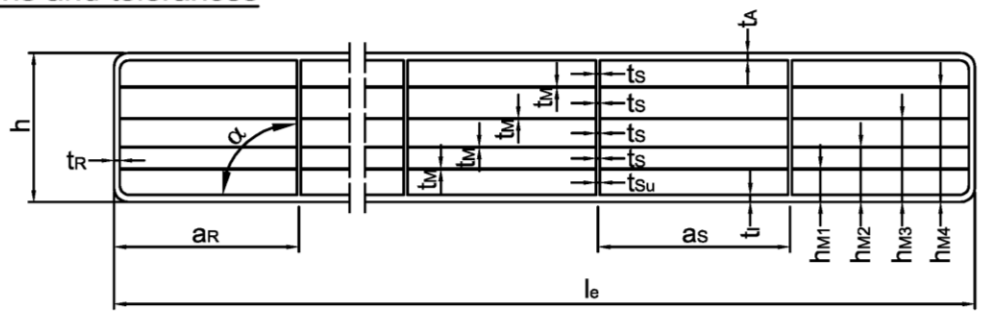
- The least bending radius amounts to 1500mm.
- The ouside with the UV-protection layer is marked by a label at the border area.

LAMILUX CI-System Lichtband B	Annex A 4.2
Components Translucent sheet Makrolon multi UV 4/10-6	

Deutsches Institut für Bautechnik DIBt

sheets description:	Makrolon multi UV 6/16-20
sheets manufracturer:	Bayer Sheet Europe GmbH
moulding composition:	ISO 7391 - PC, EL, 61-03-9
Nominal weight:	2,8 kg/m²

dimensions and tolerances



le [mm]	as [mm]	aR [mm]	h [mm]	hM1 [mm]	hM2 [mm]	hM3 [mm]	hM4 [mm]
2100	19,5	16,8	16,5	3,3	6,2	9,3	12,6

tA [mm]	tI [mm]	ts [mm]	tsu [mm]	tM [mm]	tR [mm]	α [°]	kg/m²
0,86	0,78	0,33	0,47	0,05	0,49	86 - 94	≥ 2,67

from the declaration of performence to be maintained minimums / or classes according to EN 16153

mechanical resistance (deformation behavior)				
Bx [Nm²/m]	By [Nm²/m]	Sy [Nm/m]	Mb,pos [Nm/m]	Mb,neg [Nm/m]
200,5	28	1868	60,6	65,6

Mb,pos : Outside pressure-loaded
Mb,neg : Inside pressure-loaded

Durability as change			
the yellowness index	of light transmittance	the deformation flexural modulus	the tensile strength
ΔD (≤20)	ΔD (≤10%)	Cu1	Ku1

specification of usage

- The least bending radius amounts to 2400mm.
- The outside with the UV-protection leyer is marked by a label at the border area.

LAMILUX CI-System Lichtband B	Annex A 4.3
Components Translucent sheet Makrolon multi UV 6/16-20	

CI-System Lichtband B **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 D).

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 duration depending on the load type.

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 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 and C_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.

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 zones 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 $c_{pe} = -0.7$ is used.

If the roof kit is installed on the ridge of a mono-gable roof or a hipped end roof in the zones 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 zones 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 ageing and environmental influences C_u and the factor for influence of temperature 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 for ageing and environmental influences C_u		1.10
Temperature factor C_θ	summer	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 2 for the given multi-wall sheets and direction of loading.

B 2 Characteristic structural resistances of the covering

Covering: type "PC10"

Sheet in accordance with annex (Section as per A 2.1.1 – A 2.1.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 (Makrolon multi UV 4/10-6)	1.50 ≤ R ≤ 4.40	2-span	1.054	2.21	1.90	1.61	1.61
	1.50 ≤ R ≤ 2.69	3-span	0.703	3.52	3.52	3.26	2.80
	2.69 < R ≤ 3.54	3-span	0.703	3.39	3.38	2.75	2.75
	3.54 < R ≤ 5.25	3-span	0.703	2.61	2.60	1.93	1.93
	1.50 ≤ R ≤ 3.54	5-span	0.422	8.81	8.81	3.98	3.98

Covering: type "PC10 + GFUP"

Sheet in accordance with annex (Section as per A 2.2.1 – A 2.2.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 (Makrolon multi UV 4/10-6) + GFUP	1.50 ≤ R ≤ 4.40	2-span	1.054	2.12	1,89	1.72	1.72

Covering: type "PC10 + PC6"

Sheet in accordance with annex (Section as per A 2.3.1 – A 2.3.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 + A 4.1 (Makrolon multi UV 4/10-6 + ~ 4/6-6)	1.50 ≤ R ≤ 4.40	2-span	1.054	1.71	1.71	1,97	1.66
	1.50 ≤ R ≤ 5.25	3-span	0.703	3.80	2.69	2.47	1.99

Covering: type "PC16"

Sheet in accordance with annex (Section as per A 2.4.1 – A 2.4.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.3 (Makrolon multi UV 6/16-20)	2.40 ≤ R ≤ 4.40	2-span	1.054	2.22	2.22	2.00	2.00
	2.40 ≤ R ≤ 5.25	3-span	0.703	4.26	4.26	1.92	1.92

Covering: type "PC16 + GFUP"

Sheet in accordance with annex (Section as per A 2.5.1 – A 2.5.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.3 (Makrolon multi UV 6/16-20) + GFUP	2.40 ≤ R ≤ 4.40	2-span	1.054	2.79	2.79	2.50	2.50

Covering: type "PC10 + PC10"

Sheet in accordance with annex (Section as per A 2.6.1 – A 2.6.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 + A 4.2 (2x Makrolon multi UV 4/10-6)	1.50 ≤ R ≤ 4.40	2-span	1.054	3.75	2.84	2.32	2.32
	1.50 ≤ R ≤ 2.69	3-span	0.703	4.71	4.71	2.78	2.78
	2.69 < R ≤ 5.25	3-span	0.703	6.46	6.46	6.82	5.73

Covering: type "PC10 + PC10 + GFUP"

Sheet in accordance with annex (Section as per A 2.7.1 – A 2.7.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 + A 4.2 (2x Makrolon multi UV 4/10-6) + GFUP	1.50 ≤ R ≤ 4.40	2-span	1.054	4.09	3.48	2.34	2.34

Covering: type "PC10 + PC6 tc16"

Sheet in accordance with annex (Section as per A 2.8.1 – A 2.8.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 + A 4.1 (Makrolon multi UV 4/10-6 + ~ 4/6-6) with 16mm air gap	1.50 ≤ R ≤ 4.40	2-span	1.054	1.97	1.97	1.55	1.55
	1.50 ≤ R ≤ 5.25	3-span	0.703	2.74	2.74	2.88	1.67

Covering: type "PC10 + PC10 tc16"

Sheet in accordance with annex (Section as per A 2.9.1 – A 2.9.4)	Radius R [m]	System	Distance a.p [m]	Characteristic values of structural resistance [kN/m²]			
				Downward load		Uplift load	
				R_k	C_k	R_k	C_k
A 4.2 + A 4.2 (Makrolon multi UV 4/10-6 + 4/10-6) with 16mm air gap	1.50 ≤ R ≤ 4.40	2-span	1.054	2.50	2.50	2.45	1.74
	1.50 ≤ R ≤ 5.25	3-span	0.703	3.73	3.73	2.84	1.96

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B 3 Characteristic values for structural resistance of the fasteners

For the fasteners to establish the connection covering profile with fixing bracket and fixing bracket with load converter (see Annex 2.3, section E-E and Annex 2.4, section F-F of the ETA) the characteristic values given in the following table apply for the tensile load-bearing capacity $N_{R,k}$ of the screws.

Name of screw	Components to be connected	Tensile load-bearing capacity $N_{R,k}$
EJOT JZ3-8,0 x 38	covering profile 38mm / fixing bracket "SK-Feld"; "SK-Feld 26-36"	10.7 kN
EJOT JZ3-8,0 x 64	covering profile 60mm / fixing bracket "SK-Stoß"; "SK-Stoß 26-36"	13.7 kN
EJOT JT4-6-6,3 x 30	fixing bracket "SK-Feld"; "SK-Feld 26-36" / load converter "LK24°-TS35" and fixing bracket "SK-Stoß"; "SK-Stoß 26-36" / load converter "LK24°-TS35"	8.6 kN

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Annex C

Thermal resistance

If requirements are made for the thermal resistance of the roof system, the thermal transmittance coefficient U_r is to be determined as resultant of thermal transmittance coefficients weighted on the basis of the covering surface as well as all other areas of thermal bridges existing in the installed state.

The thermal transmittance coefficient of the roof system depends on:

- surface percentage and thermal transmittance coefficient U_P of the covering,
- surface percentage and thermal transmittance coefficient U_f of the bearing profiles,
- surface percentage and thermal transmittance coefficient U_f of the eaves profiles and
- surface percentage and thermal transmittance coefficient U_f of further existing areas of thermal bridging, for example gable end fittings.

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

$$U_W = U_P \cdot A_P + \Sigma U_{fi} \cdot A_{fi} / (A_P + \Sigma A_{fi})$$

If the substructure is taken into account the thermal transmittance coefficients U_{up} of the substructure and additional the linear thermal transmittance coefficient Ψe of the connection of the roof kit with the substructure at the eaves side has to be calculated in accordance with the applicable European standards, e.g. EN ISO 6946.

C 1 Thermal transmittance coefficients of the coverings

The sheet structure correspond to those given in Annexes A 4

Table C 1 Thermal transmittance coefficients U_P of the coverings

Covering	sheet(s) as per Annex	Vertical installation U_P [W/(m²·K)]	Horizontal installation U_P [W/(m²·K)]
Typ PC10	A 4.2	2,5	2,7
Typ PC10 + GFUP	A 4.2	2,4	2,6
Typ PC10 + PC6	A 4.2, A 4.1	1,8	1,9
Typ PC16	A 4.3	1,8	1,9
Typ PC16 + GFUP	A 4.3	1,8	1,9
Typ PC10 + PC10	A 4.2	1,6	1,7
Typ PC10 + PC10 + GFUP	A 4.2	1,6	1,6
Typ PC10 + PC6 tc 16	A 4.2, A 4.1	1,4	1,5
Typ PC10 + PC10 tc 16	A 4.2	1,2	1,3

The thermal transmittance coefficients U_t depend on the selected covering 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 the U_t value for vertical installations shall be used.

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C 2 Thermal transmittance coefficients of the bearing profiles

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

Table C 2: Thermal transmittance coefficients of the bearing profiles

Covering	Bearing profile as per Annex	$U_{f(A-A)}$ [W/(m²K)]	$U_{f(B-B)}$ [W/(m²K)]
Typ PC10	A 2.1.1	2,0	2,1
Typ PC10 + GFUP	A 2.2.1	2,0	2,1
Typ PC10 + PC6	A 2.3.1	2,1	1,5
Typ PC16	A 2.4.1	1,6	1,6
Typ PC16 + GFUP	A 2.5.1	1,6	1,6
Typ PC10 + PC10	A 2.6.1	1,4	1,4
Typ PC10 + PC10 + GFUP	A 2.7.1	1,4	1,4
Typ PC10 + PC6 tc 16	A 2.8.1	1,3	1,3
Typ PC10 + PC10 tc 16	A 2.9.1	1,3	1,0

C 3 Thermal transmittance coefficients in the zone of the eaves profiles and the impost

The thermal transmittance coefficients U_f in the zone of the eaves profiles and the impost shall be determined as follows:

$$U_f = (\psi \cdot L + \chi \cdot N) / (L \cdot 0{,}141\text{m})$$

ψ: linear thermal transmittance of the eaves profiles

L: total length of the eaves profiles

χ: punctual thermal transmittance of the impost with the bearing profiles

N: number of bearing profiles

Table C 3: Linear thermal transmittance coefficient Ψ of the eaves profile and punctual thermal transmittance coefficient χ of the impost

Covering	Eaves profile: Section D-D as per Annex	ψ [W/(m·K)]	χ [W/(K)]
Typ PC10	A 2.1.2	0,20	0,031
Typ PC10 + GFUP	A 2.2.2		
Typ PC10 + PC6	A 2.3.2		
Typ PC16	A 2.4.2		
Typ PC16 + GFUP	A 2.5.2		
Typ PC10 + PC10	A 2.6.2		
Typ PC10 + PC10 + GFUP	A 2.7.2		
Typ PC10 + PC6 tc 16	A 2.8.2		
Typ PC10 + PC10 tc 16	A 2.9.2		

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C 4 Thermal transmittance coeffient of other thermal bridge sectors

The thermal transmittance coefficient and the linear thermal transmittance of other thermal bridge sectors has to be calculated according to EN ISO 10077-2 or alternatively it has to be tested according to EN 12412-2. These include for example the connections to the gable ends of the roof system.

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CI-System Lichtband B **Annex D**

Provisions for installation, packaging, transport, storage, use, maintenance 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.

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 provided by 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 must 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.

When starting the installation of the roof kit, the load converters are placed into the appropriate openings of the connecting profile "FP24°" and screwed to the substructure on eaves with the fasteners specified in the planning. The bearing profiles are positioned into the load converter "LK24°-TS35" and fixed. Thereafter the covering is placed on the bearing profiles and curved thereby by cold forming according to the radius of curvature of the bearing profiles. Afterwards the covering is fixed on eaves side with aluminium profiles and with fixing brackets "SK-Stoß" or "SK-Stoß 26-36", whereas the spacer on the fixing brackets "SK-Stoß" or "SK-Stoß 26-36", shall be in between the covering elements to secure their position.

When positioning of the multi-wall sheets the minimum fixing distances e_{curve} and e_{impost} given in the Annexes of the ETA shall be respected.

Thereafter the fixing brackets "SK-Feld" or "SK-Feld 26-36" will be mounted in the area of intermediate support, impost sealing will be installed and the covering profiles will be fixed with the self-cutting screws. The minimum screwing depth given in sections E-E and F-F of ETA Annexes A 2.1 to A 2.9 shall be respected.

It shall be ensured that all seals are fixed non-relocatable to avoid a relocation of the seal due to thermal expansion and the resulting leakage. Joins of the impost sealing shall be located below the fixing brackets.
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.

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.

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D 3 Use, maintenance, repair

The installed roof kit 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 loading direction of the bearing profiles.

For 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 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.