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and types of construction

Bautechnisches Prüfamt

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European Technical Assessment

ETA-21/0451
of 30 September 2024

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

Proline-E
Topline ELS-E

Product family
to which the construction product belongs

Self supporting translucent roof kit

Manufacturer

INDU LIGHT Produktion & Vertrieb GmbH
Willi-Brundert-Straße 3
06132 Halle / Saale
DEUTSCHLAND

Manufacturing plant

This European Technical Assessment
contains

104 pages including 91 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

**European Technical Assessment
ETA-21/0451**

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Specific Part

1 Technical description of the product

1.1 Kit description and setup

The continuous rooflight systems "Proline -E" and "Topline ELS-E" are self-supporting translucent roof kits made up of components which are factory-made and assembled on site.

The structural system of the roof kit complies with the category "Curved roof systems with additional bearing profiles" as listed in section 2.2.5.1 a) of the EAD 22089-00-0401¹.

The roof kit comprises up to 2.10 m-wide arched translucent PC multi-wall sheets which are positioned on curved bearing profiles and protected against uplift loads by covering profiles. The sheets are mounted on the eaves side in an impost profile. The multi-wall sheets are abutted along their longitudinal edges via a bearing profile.

Tensioning bands work either as tension strips which are only attached to the lower imposts (system "SpF") or by a regular screw connection directly screwed together with the bearing profiles (system "SiD"). As optional addition, solid sheets made of polymethyl methacrylate, polycarbonate, GRP or aluminium can be combined. One to five additional bearing profiles can be arranged parallel to the edge profiles (two-, three-, four-, five- and six-span systems).

Additionally, in so-called frame subcarrier (SUT) further sheets can be suspended between the supporting profiles. For the systems "TOPLINE ELS-E", a 10 mm thick multi-wall sheet, a PMMA solid sheet with a thickness of 3 mm, 4 mm or 5 mm or a PC solid sheet with a thickness of 3 mm, 4 mm or 5 mm can be suspended between the bearing profiles.

The roof kits consist of the following components:

- translucent polycarbonate (PC) multi-wall sheets with thicknesses of 10 mm (PC 10), 16 mm (PC 16) or 20 mm (PC 20), including combinations of sheets; optionally also used as a suspended sheet (10 mm) or as an underhanging sheet (10 mm or 16 mm)
- 2, 3, 4 mm solid sheets made from polymethyl methacrylate (PMMA) (optionally arranged under the multi-wall sheets PC \geq 16) or 3, 4, 5 mm solid sheets made from polymethyl methacrylate as a suspended sheet,
- 2, 3, 4 mm solid sheets made from polycarbonate (PC) (optionally arranged under or on top of the multi-wall sheets)
- 1,2 or 1.3 mm glass fibre-reinforced unsaturated polyester resin (GRP) sheet (optionally arranged under and/or on top of a multi-wall sheet),
- 1,0 mm aluminium sheet (optionally arranged under and/or on top of a multi-wall sheet),
- bearing and covering profiles made of aluminium,
- impost profiles (impost profile with clamping profile, adapter, if necessary,) made of aluminium,
- additional profiles for "Topline ELS-E" made of aluminium or polyvinyl chloride (PVC)
- fixing brackets made of stainless steel
- sealing profiles,
- frame subcarrier, made of polycarbonate (PC)
- spacer, made of polypropylene (PP) or polyvinyl chloride (PVC)
- Insulation materials
- connecting devices.

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

¹ EAD 22089 00-0401

Self supporting translucent roof kits with covering made of plastic sheets;
edition march 2019

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 documentation² 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 16153³ may be used.

Table 1: PC-sheets

Manufacturer	Trade name	Sheet height [mm]	Main covering	Hanging from the frame subcarrier	Suspended from the bearing profile	Annex
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 6/16-20	16	X	–	–	A 4.1
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 7/16-14	16	X	X	–	A 4.2
CORPLEX, F–Kaysersberg	Akyver Sun Type 16/7w-12 2600	16	X	X	–	A 4.3
Stabilit Suisse S.A. CH – Stabio	Macrolux LL 7W- 16 mm 2600	16	X	–	–	A 4.4
Stabilit Suisse S.A. CH – Stabio	Macrolux LL 7W- 16 mm 2700	16	X	–	–	A 4.5
Dott. Gallina s.r.l I– La Loggia	Policarb 16 mm 6W	16	X	–	–	A 4.6
Dott. Gallina s.r.l I– La Loggia	Policarb 16 mm 7W	16	X	X	–	A 4.7
Rodeca GmbH D – Mülheim	Hohlkammer- scheibe PC 16-5 High Impact	16	X	–	–	A 4.8
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 3/16-16-980	16	X	–	–	A 4.9
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 3/16-16-1200	16	X	–	–	A 4.10
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 4/10-6	10	–	X	X	A 4.11
CORPLEX, F–Kaysersberg	Akyver Sun Type 10/4w-7 1750	10	–	X	X	A 4.12
Stabilit Suisse S.A. CH – Stabio	Macrolux LL 4W-10 mm	10	–	X	X	A 4.13
Dott. Gallina s.r.l I– La Loggia	Policarb 10 mm 4W	10	–	X	X	A 4.14

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

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

Manufacturer	Trade name	Sheet height [mm]	Main covering	Hanging from the frame subcarrier	Suspended from the bearing profile	Annex
Dott. Gallina s.r.l I- La Loggia	Policarb 10 mm 5W	10	–	X	X	A 4.15
Rodeca GmbH D – Mülheim	Hohlkammer- scheibe PC 10-4	10	–	X	X	A 4.16
Polycasa N.V. BE – Geel	IMPEX MULTI- WALL 10/4w	16	–	X	X	A 4.17
Exolon Group S.p.A. IT – Nera Montoro	Exolon multi UV 7/20-14	20	X	–	–	A 4.18
CORPLEX, F-Kaysersberg	Akyver Sun Type 20/7w-12	20	X	–	–	A 4.19
Stabilit Suisse S.A. CH – Stabio	Macrolux LL 7W-20 mm	20	X	–	–	A 4.20

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

1.1.2 Optional (full-surface) covering supplements

The following sheets for the optional full-surface supplements for the PC 16 or PC 20 main covering correspond in width and length to the multiwall sheets of the main covering. They may consist of several smaller parts if they are abutted over a bearing profile. In this case, the horizontal position is ensured by spacers.

1.1.2.1 Solid sheet PMMA

The 2 – 4 mm - thick solid PMMA sheet is made of polymethyl methacrylate (PMMA) by extrusion and is in accordance with EN ISO 7823-2⁴. It is always used internally for PC ≥16 systems. A combination with the PC 20 systems is not intended. Similar 3 mm, 4 mm or 5 mm thick sheets are used as the suspended sheets. Depending on the thickness, the panels have the following weights per unit area:

2 mm| 2,4kg/m²; 3 mm| 3,5kg/m²; 4 mm| 4,7kg/m²; 5 mm| 5,9kg/m²;

1.1.2.2 Solid sheet PC

The 3 – 5 mm - thick solid polycarbonate (PC) sheet possessing a weight per unit area of 3,6 – 6,0 kg/m² in accordance with the harmonised European standard EN 16240⁵ can be used. It can be installed under the or on top of the PC ≥16 systems. UV protection in accordance with EN 1013⁶ is provided for outside applications. A combination with the PC 20 systems is not intended.

⁴ EN ISO 7823-2:2003 Plastics - Poly(methyl methacrylate) sheets - Types, dimensions and characteristics - Part 2: Extruded sheets

⁵ EN 16240:2014-03 Light transmitting **flat** solid polycarbonate (PC) sheets for internal and external use in roofs, walls and ceilings - Requirements and test methods

⁶ EN 1013:2012+A1:2014 Light transmitting single skin profiled plastics sheets for internal and external roofs, walls and ceilings - Requirements and test methods

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1.1.2.3 GRP sheet

The sheet is made from glass fibre-reinforced unsaturated polyester resin with a thickness of 1.2 mm and a weight per unit area of 165 g/m² or 1.3 mm and a weight per unit area of 185 g/m². The glass content must be at least 20 % by mass. The heat resistant temperature of the resin (HDT) is at least 65°C. It can be used both inside and outside. As an outside sheet, surface protection against weathering must be provided in accordance with EN 1013 is provided. It corresponds to the specifications deposited with Deutsches Institut für Bautechnik.

1.1.2.4 Aluminium sheet

The aluminium sheets are made from the aluminium alloy EN AW-1050A in accordance with EN 573-3⁷ with a thickness of 1.0 mm and shall correspond with the multi-wall sheets in width and length.

1.1.3 Bearing profiles and covering profiles

The bearing and the covering profiles (see Annex A 2.1.1) are made from the aluminium alloy EN AW-6060 T66 in accordance with EN 755-2⁸ and have the dimensions given in Annex A 3.1 and A 3.2 of the ETA.

1.1.4 Impost

The impost, at perpendicular to the walls of the sheets, consists at least an impost profile and clamping profile (see e.g. Annex A.2.1.3). For the continuous roofkits "TOPLINE ELS SpF", adapter profiles are additionally required (see e.g. Annex A.2.4.3). All profiles must be made of aluminium EN AW-6060, condition T66 according to DIN EN 755-2 and have the dimensions given in Annex A.3.3 to A.3.5 or Annex A.3.10 of the ETA.

1.1.5 Additional profiles for "Topline ELS-E"

The additional profiles for position securing of the suspended sheet for "Topline ELS-E" is made of aluminium (clip profile ELS (AL), covering profile ELS, tensioning band ELS and Z-profile ELS) EN AW-6060, condition T66 according to DIN EN 755-2 or of polyvinyl chloride (clip profile ELS (PVC)), according to EN ISO 21306-1⁹-PVC-U, EGLFP 082-25-28. This corresponds to the deposit at the Deutsches Institut für Bautechnik and have the dimensions given in Annex A.3.5.2 of the ETA.

1.1.6 Fixing bracket SpF

The fixing bracket SpF (see Annex A 2.4.3) is made of stainless steel material no. 1.4301 according to EN 10088-2¹⁰. It is available in three types, which differ in width and has the dimensions given in Annex A 3.6 of the ETA.

1.1.7 Sealing profiles

The sealing profiles (see Annex A 2.1.1, 2.2.1, 2.3.1, 2.4.1, 2.5.1 and 2.6.1) are made from Ethylen/ Propylen-Terpolymer EPDM in accordance with DIN 7863-1¹¹ with Shore hardness of 60 ± 5, 70 ± 5 or 95 ± 5 Shore A in accordance with EN ISO 868¹². The sealing profile B consists of thermoplastic elastomer (TPE) and EPDM.

7	EN 573-3:2013-12	Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products
8	EN 755-2:2016-10	Aluminium and aluminium alloys - Extruded rod/bar, tube and profiles - Part 2: Mechanical properties
9	EN ISO 21306-1; 2019	Plastics - Unplasticized poly(vinyl chloride) (PVC-U) moulding and extrusion materials - Part 1: Designation system and basis for specifications
10	EN EN 10088-2:2014	Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
11	DIN 7863-1:2011-10	Elastomer glazing and panel gaskets for windows and claddings - Technical delivery conditions - Part 1: Non cellular elastomer glazing and panel gaskets
12	EN ISO 868:2003	Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness)

In the sealing profile D there is also a steel clip made of cold strip according to DIN EN 10139¹³. The sealing profiles have the dimensions given in Annex A 3.9 of the ETA.

1.1.8 Frame subcarrier (SUT)

The frame subcarrier (see Annex A 2.3.1 and 2.4.1) is made of polycarbonate (PC) DIN EN ISO 21305-1¹⁴ PC, X, EGL, 03-09. The frame subcarrier has the dimensions, depending on the thickness of the sheet suspended in, given in Annex A 3.8 of the ETA.

1.1.9 Spacer

The spacer 10 and 19 (see Annex A 2.1.1, 2.2.1 and 2.3.1) are made of polypropylene (PP) DIN EN ISO 19069-1¹⁵. The spacers 16, 18 and 20 are made of polyvinyl chloride (PVC-U) DIN EN ISO 21306-1. Alternatively, the spacers can also be made of aluminium or stainless steel with the material number 1.4301 according to EN 10088-2. The spacers have the dimensions, depending on the roofkit, given in Annex A 3.7 of the ETA.

1.1.10 Insulation materials

If additional insulation materials are used as shown in Annex A 2.4.2 and A 2.4.3 e.g., they need to fill the complete void in between the aluminium profiles.

The following materials are used: Mineral wool in accordance with DIN EN 13162¹⁶, EPS in accordance with DIN EN 13163¹⁷, XPS in accordance with DIN EN 13164¹⁸, PU in accordance with DIN EN 13165¹⁹ or Polyester fibres "CARUSO ISO BOND" in accordance with Z-23.1.3-278²⁰.

1.1.11 Connecting devices

The connection between the covering profile and fixing bracket SPF (see Annex 2.1.3.1 e.g) is made with two self-tapping screws Type Reisser Schraubentechnik GmbH /FABA-A 6,5x64 (Ø 6,5 mm, material no. 1.4301 without sealing washer in accordance with Z-14.1-4, or equivalent.

The connection between the bearing profile and fixing bracket SPF (see Annex 2.1.3.1 e.g) is made with one self-tapping screws Type Reisser Schraubentechnik GmbH /FABA-A 6,5x64 (Ø 6,5 mm, material no. 1.4301 without sealing washer in accordance with Z-14.1-4, or equivalent. The connection between the covering profile and bearing profile (see Annex 2.1.3.2 e.g) is made in distance of 300 mm with self-tapping screws Type Reisser Schraubentechnik GmbH /FABA-A 6,5xL (Ø 6,5 mm, material no. 1.4301 without sealing washer in accordance with Z-14.1-4, or EJOT Baubefestigungen GmbH /JA3 6,5xL in accordance with ETA-10/0200 or equivalent.

The connection between the bearing profile and impost profile and subconstruction (see Annex 2.4.2 e.g) is made of two screws Type Reisser Schraubentechnik GmbH / RS-K 6,3x38 in accordance with Z-14.1-4, or Adolf Würth GmbH & Co. KG / Zebra Piasta 6,3 x 38 with sealing washer ≥ 14 in accordance with ETA-10/0184 or equivalent.

13	EN 10139:2020	Cold rolled uncoated low carbon steel narrow strip for cold forming - Technical delivery conditions
14	EN ISO 21305-1:2019	Plastics - Polycarbonate (PC) moulding and extrusion materials - Part 1: Designation system and basis for specifications
15	EN ISO 19069-1:2015	Plastics - Polypropylene (PP) moulding and extrusion materials - Part 1: Designation system and basis for specifications
16	DIN EN 13162:2015-04	Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification; German version EN 13162:2012+A1:2015
17	DIN EN 13162:2017-02	Thermal insulation products for buildings - Factory made expanded polystyrene (EPS) products - Specification; German version EN 13163:2012+A2:2016
18	DIN EN 13164:2015-04	Thermal insulation products for buildings - Factory made extruded polystyrene foam (XPS) products - Specification; German version EN 13164:2012+A1:2015
19	DIN EN 13165:2016-09	Thermal insulation products for buildings - Factory made rigid polyurethane foam (PU) products - Specification; German version EN 13165:2012+A2:2016
20	Z-23.1.3-278: DIBt 2020	Wärmedämmstoff aus Polyesterfasern "CARUSO-ISO-Bond"

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The connection between the clamping profile and impost profile (see Annex 2.4.2.1 e.g) is made in distance of 280 mm of screws Type EJOT Baubefestigungen GmbH /JA3 6,5x25 in accordance with ETA-10/0200 or equivalent.

The connection between the adapter and impost profile (see Annex 2.4.3.1 e.g) is made of one screw Type EJOT Baubefestigungen GmbH / JT3-FR-6-5,5x25 in accordance with ETA-10/0200 or equivalent.

The connection between the adapter and clamping profile (see Annex 2.4.3.1 e.g) is made of two screws Type EJOT Baubefestigungen GmbH / JT4-6-5,5x22 in accordance with ETA-10/0200 or equivalent.

The connection between fixing bracket and impost profile (see Annex 2.4.3.2 e.g) is made of two screws Type EJOT Baubefestigungen GmbH / JT3-6-5,5x50 in accordance with ETA-10/0200 or equivalent.

The connection between the covering profile ELS and bearing profile ELS (see Annex 2.4.1.3 e.g) is made in distance of 280 mm of screws Type Adolf Würth GmbH & Co. KG / Zebra Pias A2 4,2 x 32 in accordance with ETA-10/0184 or equivalent.

The tensioning band (see Annex 2.4.3.3 e.g) is fixed with screws Type EJOT Baubefestigungen GmbH / JT3-6-5,5x70 in accordance with ETA-10/0200 or equivalent.

1.1.12 "Proline-E"/ "Topline ELS-E"

The roof kits are made up of the components described in Sections 1.1.1 to 1.1.11. Depending on the type of the kit and the type of the covering the following components and optional components in accordance with table 2 are used:

Table 2: Combinations of covering

1	Rooflight system:	TOPLINE ELS-E	PROLINE-E
2	Main covering: multi-wall PC [mm]	16; 20	16; 20
3	Hanging from the frame subcarrier (SUT) : multi-wall PC [mm]	16; 10	16; 10
4	Suspended from the bearing profile for "Topline ELS-E" only		
	– multi-wall PC sheet [mm] <i>or</i>	10	–
	– Solid sheet PMMA: AC x[mm] <i>or</i>	AC3; AC4; AC5	–
	– Solid sheet PC x[mm]	PC3; PC4; PC5	–
5	Solid sheet full-surface over the top/outside main covering(a)		
	– GRP-sheet x[mm] <i>or</i>	GRP 1,3a	GRP 1,3a
	– Aluminium-sheet <i>or</i>	Al a	Al a
	– Solid sheet PMMA: AC x[mm] <i>or</i>	AC2a; AC3a*; AC4a*	AC2a; AC3a*; AC4a*
	– Solid sheet PC x[mm]	PC2a; PC3a*; PC4a*	PC2a; PC3a*; PC4a*
6	Solid sheet full-surface under the top/outside main covering (i)		
	– GRP-sheet x[mm] <i>or</i>	GRP 1,2i	GRP 1,2i
	– Aluminium-sheet <i>or</i>	Al i	Al i
	– Solid sheet PMMA: AC x[mm] <i>or</i>	AC2i; AC3i*; AC4i*	AC2i; AC3i*; AC4i*
	– Solid sheet PC x[mm]	PC2i; PC3i*; PC4i*	PC2i; PC3i*; PC4i*

* 3 mm and 4 mm thick solid sheets are only used with 16 mm thick PC sheets of the main covering: line [2]

Depending on the external PC sheets used and the covering profiles used, the following support systems (EF= single-span system; MF= multi-span system) may be used (Table 3):

Table 3: Combinations of support system

Covering profile	Multi-wall sheet as per Annex A	Support system					
		1-span	2-span	3-span	4-span	5-span	6-span
SpF/ SiD	4.1 bis 4.7	EF *	MF **	MF	MF	MF	MF
	4.18 bis 4.20	EF *	MF **	MF	MF	MF	MF
SiD	4.8 bis 4.10	EF	MF	MF	–	–	–

* for 3.00 m < arch radius "r" < 4.50 m, no single-span system is provided
for arch radius "r"<3.00m, the distance between the load-bearing profiles is ≤ 1070mm

** for 3.00 m < arch radius "r" < 4.50 m, the distance between the load-bearing profiles is ≤ 1070mm

The "TOPLINE ELS-E" roof kits (for examples, see Annexes A 2.1.1, A 2.2.1, A 2.3.1, A 2.3.2 and A 2.4 to A 2.7) may be carried out in accordance with Table 4 with additional optional coverings:

Table 4:

Main covering: multi-wall PC sheet [mm]		Hanging from the frame subcarrier (SUT)		Suspended from the bearing profile		
16	20	10 mm in accordance with Ann. A	16 mm in accordance with Ann. A	PC 10 in accordance with Ann. A	Solid sheet PMMA [3 ,4 ,5 mm]	Solid sheet PC [3 ,4 ,5 mm]
16/–/–	20/–/–	–	–	–	–	–
16/10/–	20/10/–	4.11- 4.17	–	–	–	–
16/16/–	20/16/–	–	4.2, 4.3, 4.7	–	–	–
16/–/10	20/–/10	–	–	4.11- 4.17	–	–
16/16/10	20/16/10	–	4.2, 4.3, 4.7	4.11- 4.17	–	–
16/–/XCx	20/–/XCx	–	–	–	X	X
16/16/XCx	20/16/XCx	–	4.2, 4.3, 4.7	–	X	X

The "PROLINE-E" roof kits (for examples, see Annexes 2.1 to 2.3) may be carried out in accordance with Table 5 with additional optional coverings:

Tabelle 5

Main covering: multi-wall PC [mm]		Hanging from the frame subcarrier (SUT)	
16	20	10 mm in accordance with annex	16 mm in accordance with annex
16/–	20/–	–	–
16/10	20/10	4.11- 4.17	–
16/16	20/16	–	4.2, 4.3, 4.7

If the roof kits are intended to come into contact with chemical substances, the resistance of the multi-wall sheets to the chemicals must be checked.

Table 6: Reaction to fire of the components

Component	Reaction to fire
Multi-wall sheets/ coverings	Class in accordance with DoP of EN 16153 Annex A 4.1-A 4.20
Solid PC sheet	Class in accordance with DoP of EN 16240/ Class B-s2,d0 in accordance with EN 13501-1 ²¹
GRP, PMMA sheet, clip profile ELS (PVC), frame subcarrier,	Class E in accordance with EN 13501-1
Insulation materials	Class in accordance with the DoP of
Mineralwolle nach EN 13162	EN 13162
EPS in accordance with EN 13163	EN 13163
XPS in accordance with EN 13164	EN 13164
PU in accordance with EN 13165	EN 13165
Polysterfasern "CARUSO ISO BOND"	Class E acc. to EN 13501-1 in accordance with Z-23.1.3-278
Sealing profiles, spacer 10 and 19	No contribution to fire spread in accordance with EOTA TR 021 (Version June 2005)
Bearing and covering profiles	Class A1 as per EN 13501-1 (without further testing as per Decision 96/603/EC, as amended by Commission Decisions 2000/605/EC and 2003/424/EC)
Fixing bracket and impost profiles	
Aluminium sheet	
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 plane view.

When installed, the roof kit is not walkable and it may not be used for bracing of the roof support structure.

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

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

²¹ DIN EN 13501-1:2019-05 Klassifizierung von Bauprodukten und Bauarten zu ihrem Brandverhalten - Teil 1: Klassifizierung mit den Ergebnissen aus den Prüfungen zum Brandverhalten von Bauprodukten; Deutsche Fassung EN 13501-1:2018

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 additional GRP sheet or Alu-sheet ¹⁾ and roof slope $\leq 20^\circ$	Broof (t1) in accordance with EN 13501-5 ²²
Fire performance in case of external fire exposure except for the above mentioned	No performance assessed
Reaction to fire	Class E in acc. with EN 13501-1
Resistance to fire	No performance assessed

1) The PC-sheets and the combinations according to Table 7 must be used. A GRP sheet in accordance with section 1.1.2.3 with a thickness of 1.2 mm or 1.3 mm or an aluminium sheet in accordance with section 1.1.2.4 with a thickness of 1.0 mm must be used.

Table 7: PC-sheets and the combinations

No.	Main covering (from outside to inside)			Hanging from the frame subcarrier	Suspended from the bearing profile
	1.layer	2. layer	3. layer		
1	Exolon multi UV 6/16-20 Annex A 4.1	GRP sheet / Aluminium sheet	–	–	Exolon multi UV 4/10-6 Annex A 4.11
2	Exolon multi UV 6/16-20 Annex A 4.1	GRP sheet / Aluminium sheet	–	Exolon multi UV 6/16-20 Annex A 4.1	Exolon multi UV 4/10-6 Annex A 4.11
3	Exolon multi UV 7/16-14 Annex A 4.2	GRP sheet / Aluminium sheet	–	–	Exolon multi UV 4/10-6 Annex A 4.11
4	Exolon multi UV 7/16-14 Annex A 4.2	GRP sheet / Aluminium sheet	–	Exolon multi UV 7/16-14 Annex A 4.2	Exolon multi UV 4/10-6 Annex A 4.11
5	Exolon multi UV 7/16-14 Annex A 4.2	GRP sheet / Aluminium sheet	–	–	Exolon multi UV 4/10-6 Annex A 4.11
6	GRP sheet / Aluminium sheet	Exolon multi UV 6/16-20 Annex A 4.1	GRP sheet / Aluminium sheet	–	–
7	GRP sheet / Aluminium sheet	Exolon multi UV 7/16-14 Annex A 4.2	–	–	–
8	GRP sheet / Aluminium sheet	Exolon multi UV 7/16-14 Annex A 4.2	–	Exolon multi UV 7/16-14 Annex A 4.2	Exolon multi UV 4/10-6 Annex A 4.11

²² 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

No.	Main covering (from outside to inside)			Hanging from the frame subcarrier	Suspended from the bearing profile
	1. layer	2. layer	3. layer		
9	Exolon multi UV 6/16-20 Annex A 4.1	GRP sheet / Aluminium sheet	–	–	–
10	Akyver Sun Type 16/7w-Annex A 4.3	GRP sheet / Aluminium sheet	–	–	–
11	Exolon multi UV 6/16-20 Annex A 4.1	GRP sheet / Aluminium sheet	–	Exolon multi UV 4/10-6 Annex A 4.11	–

3.2 Hygiene, health and the environment (BWR 3)

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

3.3 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic structural resistance of the multi-wall sheets to forces (actions) resulting from downward loads and uplift loads [kN/m ²]	See Annex B 2
Characteristic load bearing capacity of the impost	See Annex B 3
Consideration of the effect of load duration	See Annex B 1
Consideration of ageing and environmental effects	See Annex B 1
Consideration of thermal effects	See Annex B 1
Values for characteristic structural resistance of aluminium bearing and covering profiles	European harmonized specifications apply.
Resistance to damage by impact loads with a soft object (50 kg)	SB 0 (no requirement)
Resistance to impact loads from a hard object (250 g)	Passed as per EN 16153

3.4 Protection against noise (BWR 5)

No performance assessed

3.5 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance	No performance assessed
Air permeability	Class C according to Delegated Regulation (EU)
Radiation Properties * – Light transmission – Total solar energy transmittance	Declaration of performance as per EN 16153
* 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) 220072-00-0401, the legal basis is as follows: 98/600/EC

The system to be applied is: 3

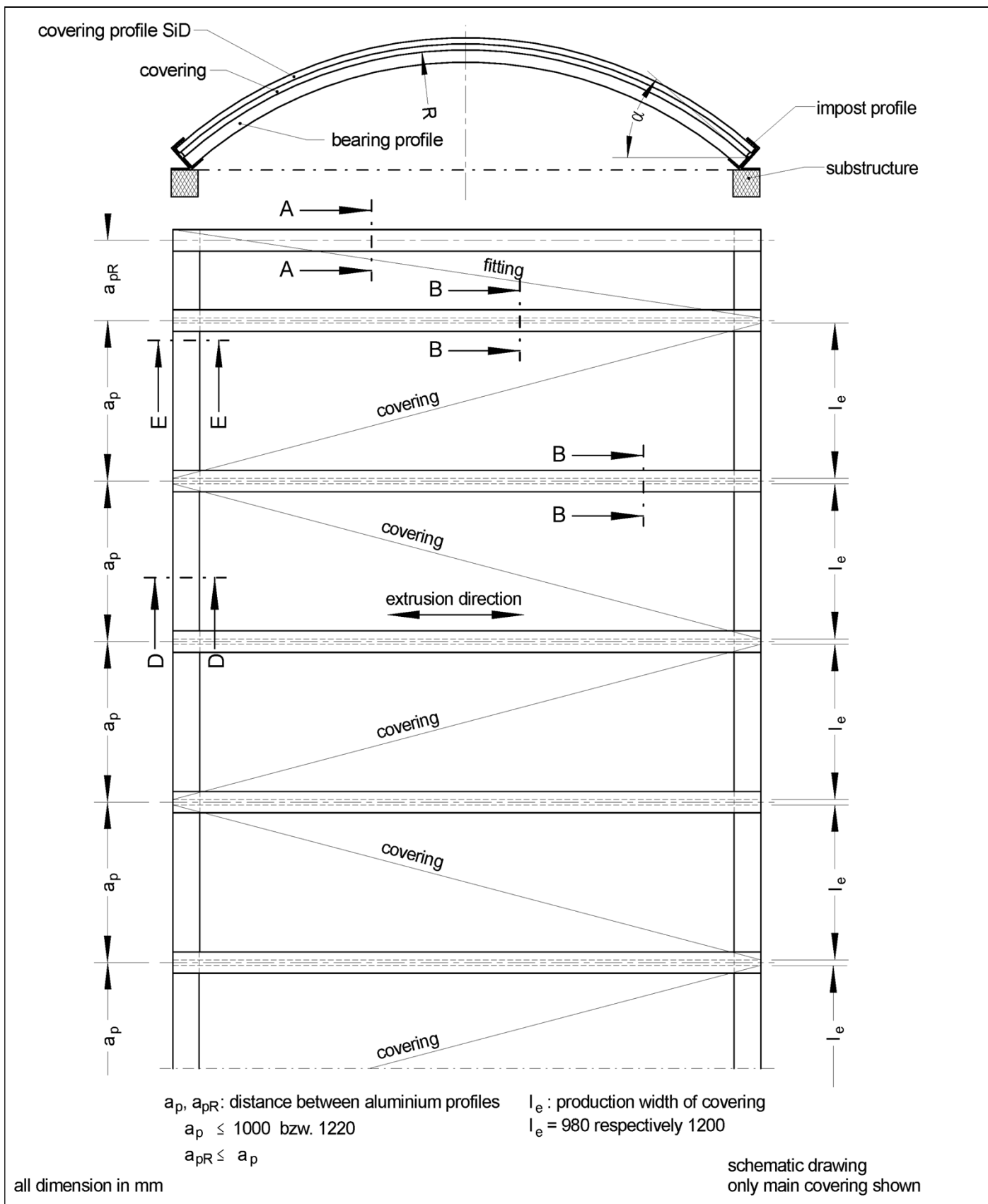
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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 30 September 2024 by Deutsches Institut für Bautechnik

Renée Kamanzi-Fechner
Head of Section

beglaubigt:
Wachner

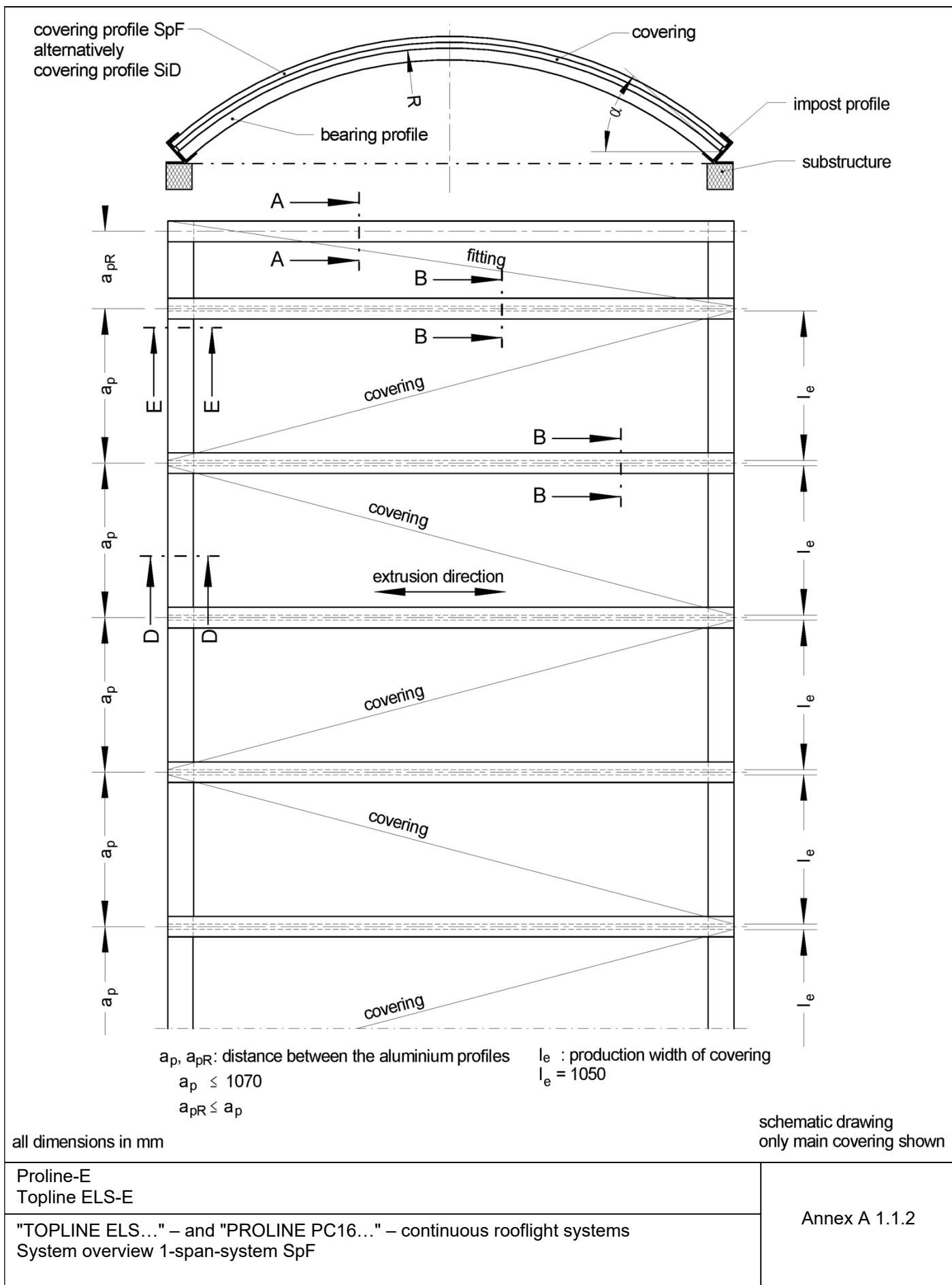


Electronic copy by DIBt: ETA-21/0451

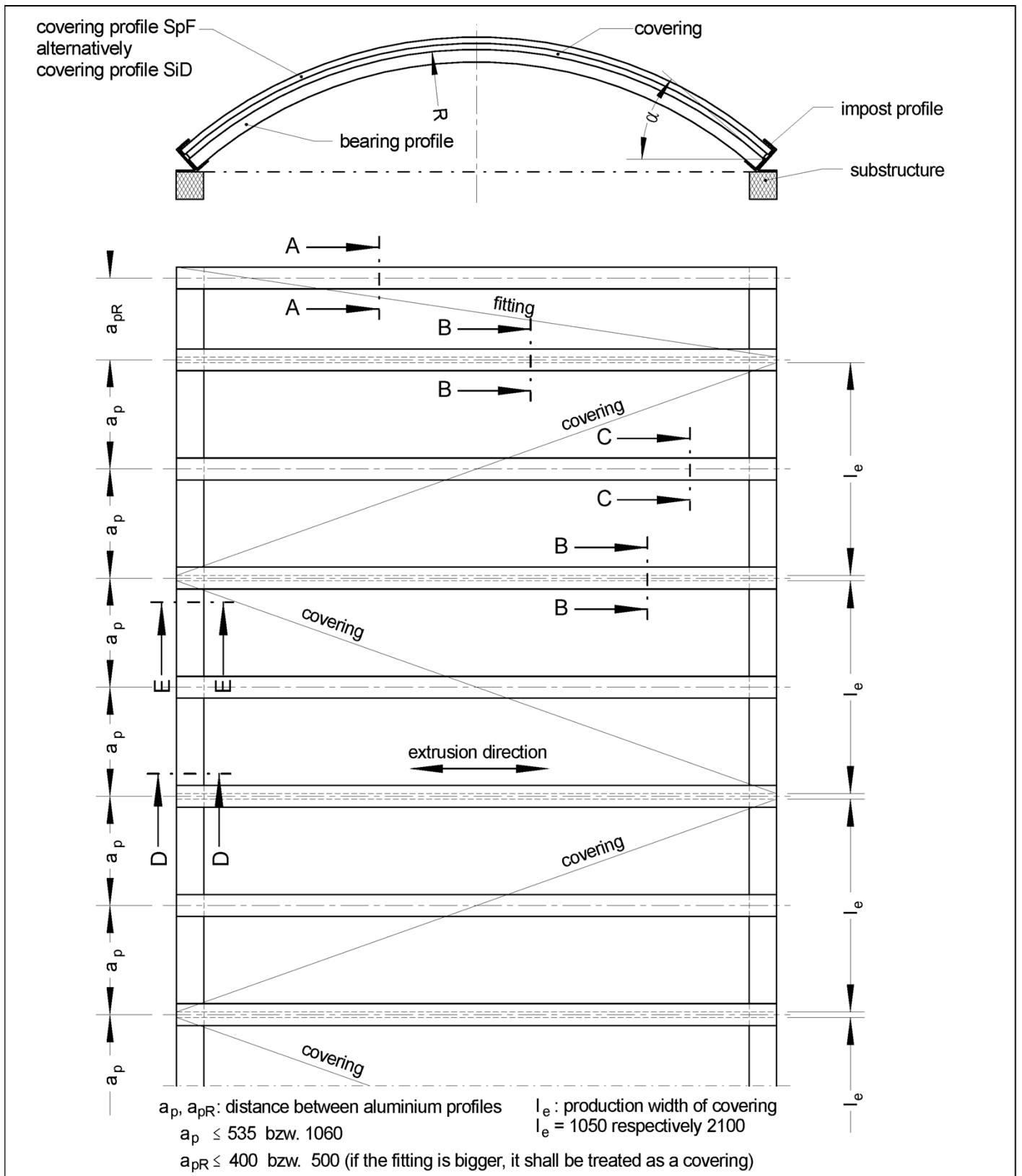
Proline-E
Topline ELS-E

"TOPLINE ELS..." – continuous rooflight systems
System overview 1-span-system SiD

Annex A 1.1.1



Electronic copy by DIBt: ETA-21/0451



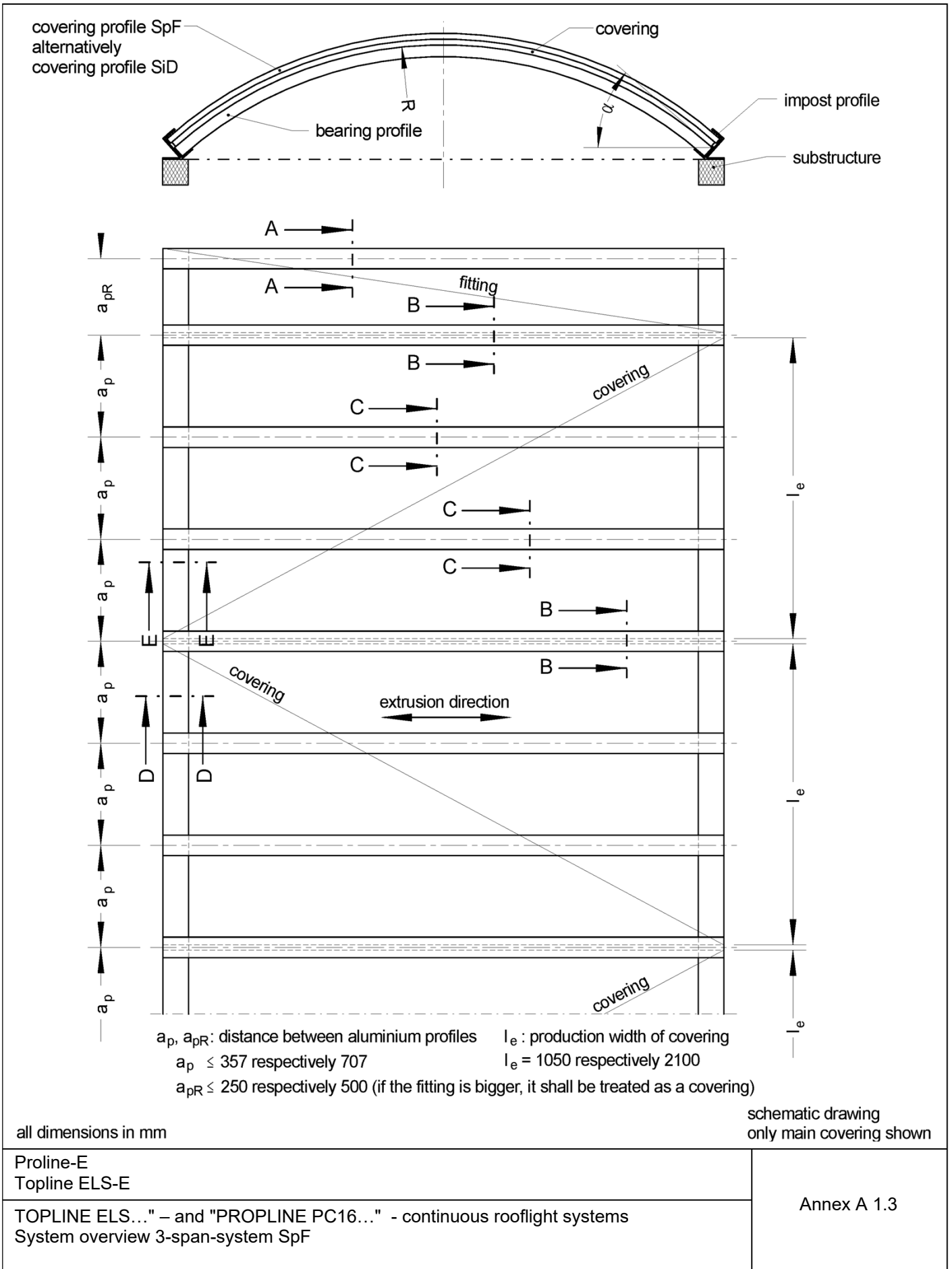
all dimensions in mm

schematic drawing
 only main covering shown

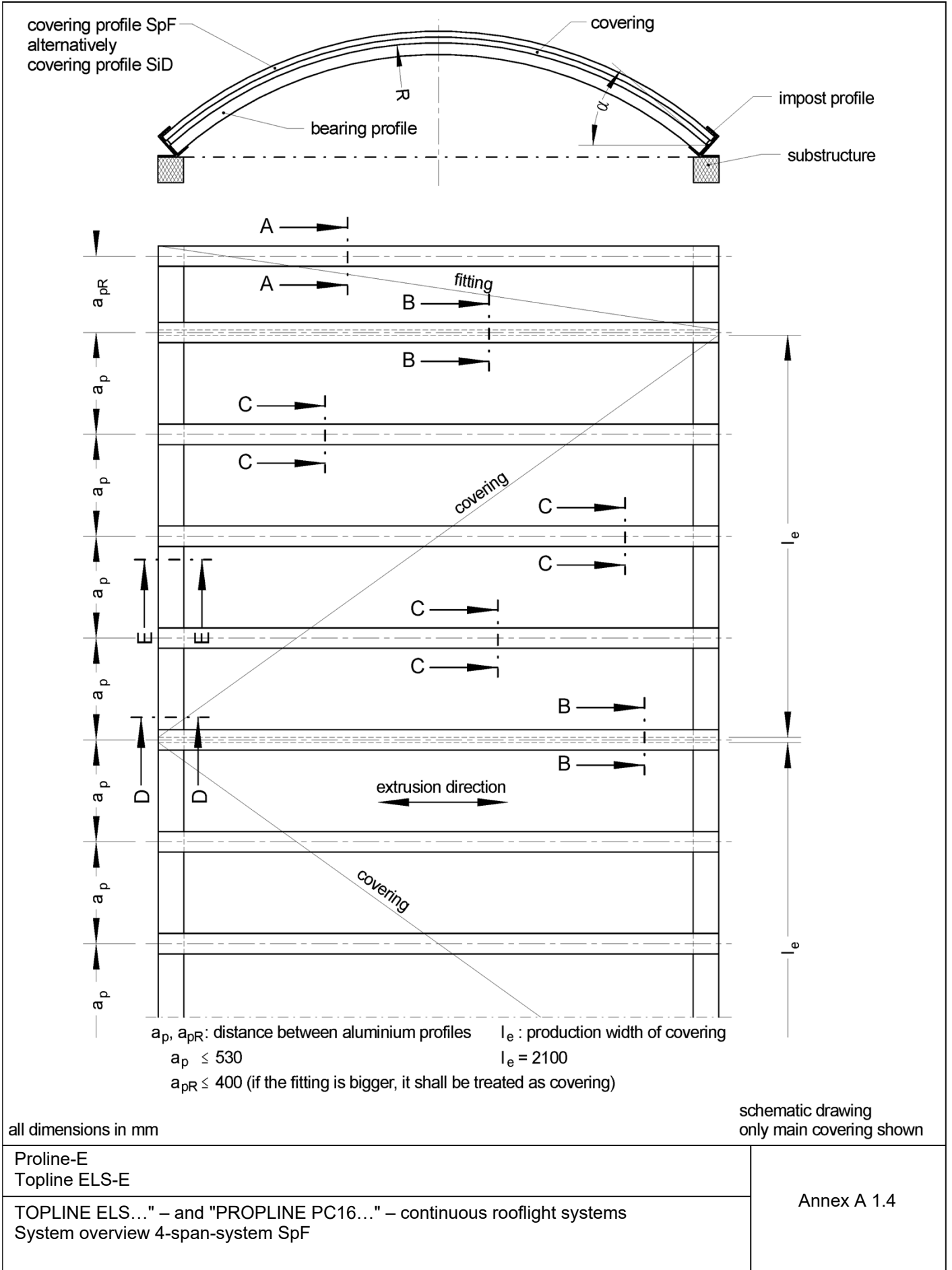
Proline-E
 Topline ELS-E

"TOPLINE ELS..." – and "PROPLINE PC16..."
 System overview 2-span-system SpF

Annex A 1.2

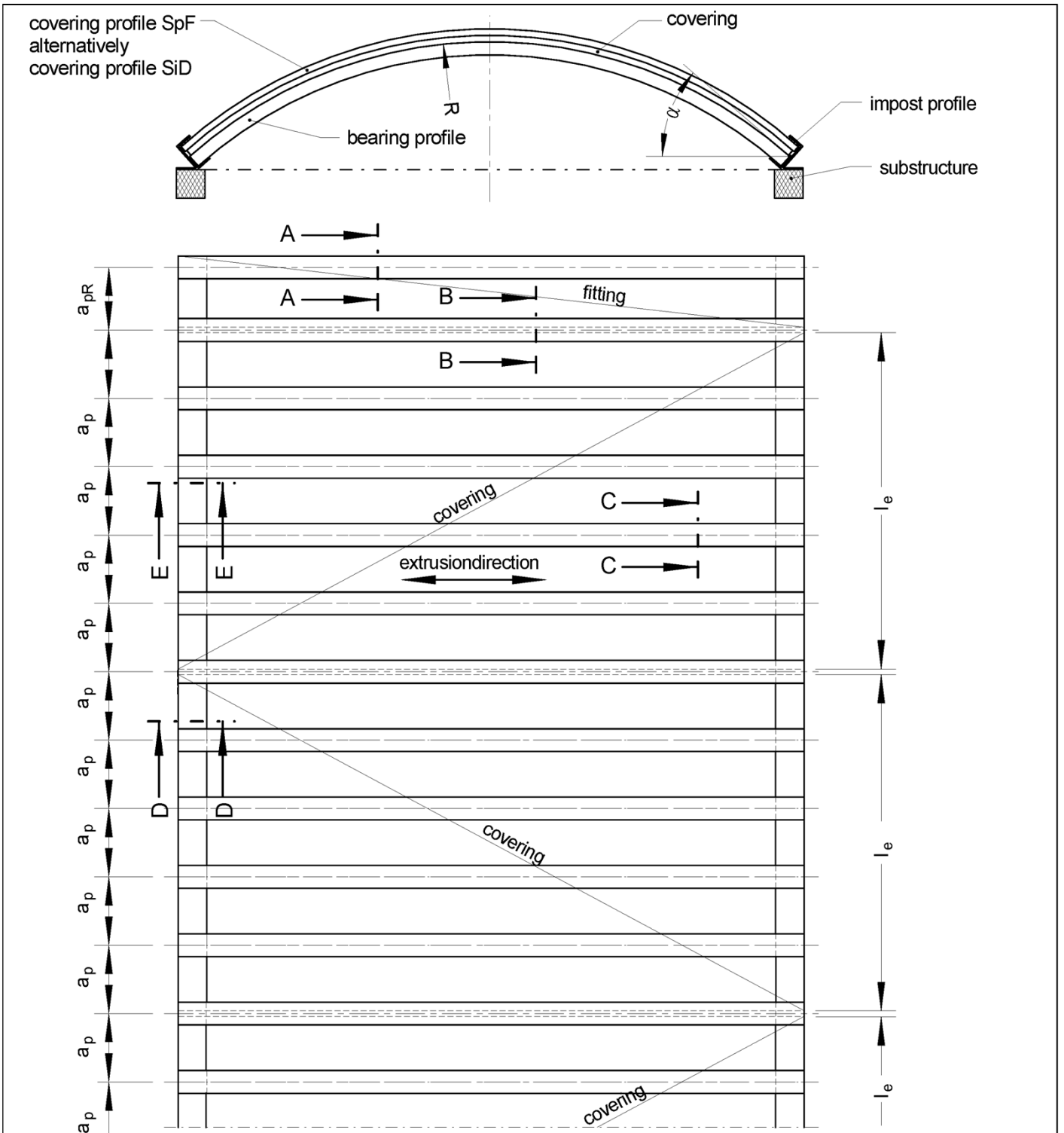


English translation prepared by DIBt



Electronic copy by DIBt: ETA-21/0451

English translation prepared by DIBt



a_p, a_{pR} : distance between the aluminium profiles l_e : production width of the covering
 $a_p \leq 424$ $l_e = 2100$
 $a_{pR} \leq 350$ (if the fitting is bigger, it shall be treated as covering)

all dimensions in mm

schematic drawing
only main covering shown

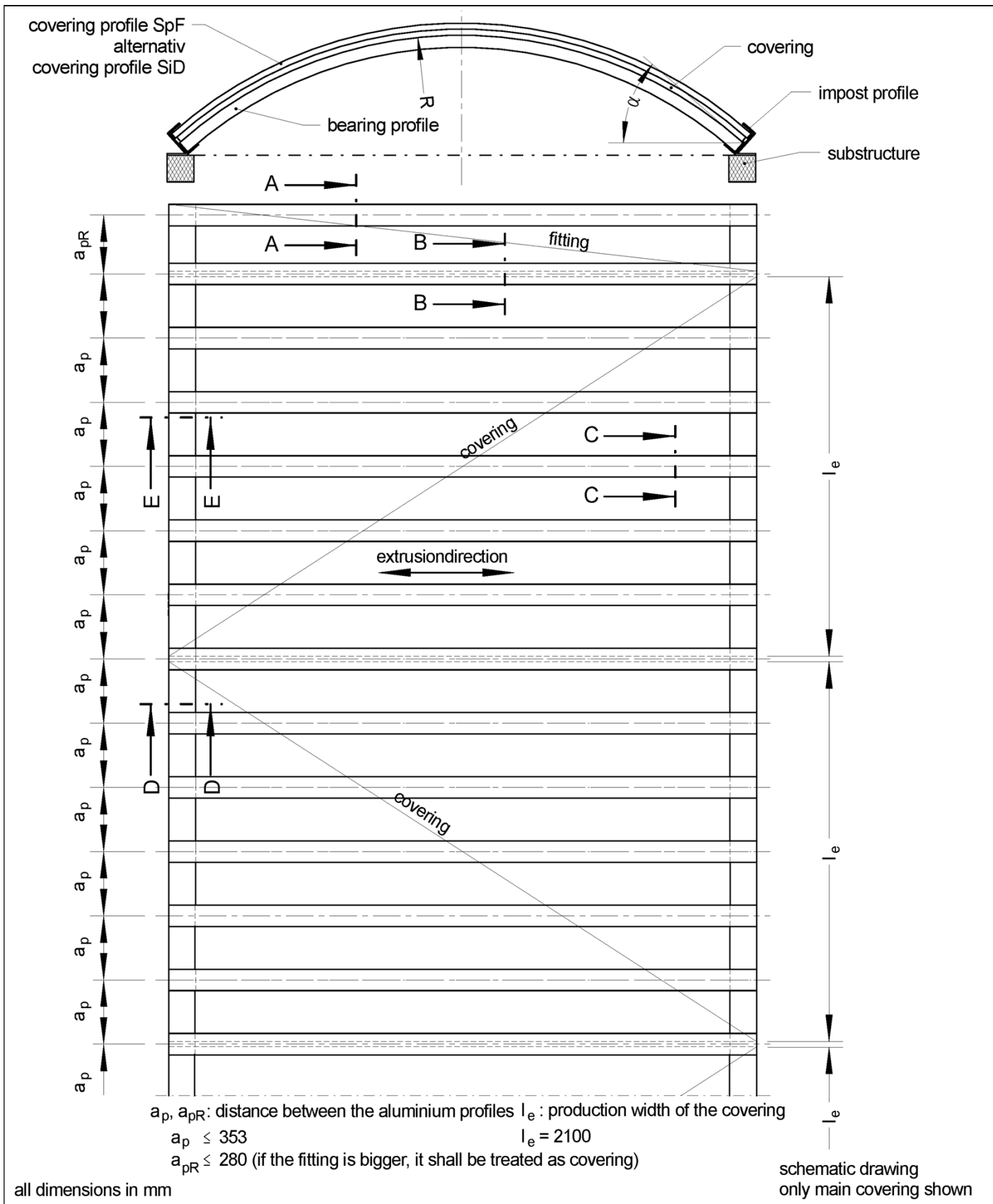
Proline-E
Topline ELS-E

TOPLINE ELS... – and "PROPLINE PC16..."
System overview 5-span-system SpF

Annex A. 1.5

Electronic copy by DIBt: ETA-21/0451

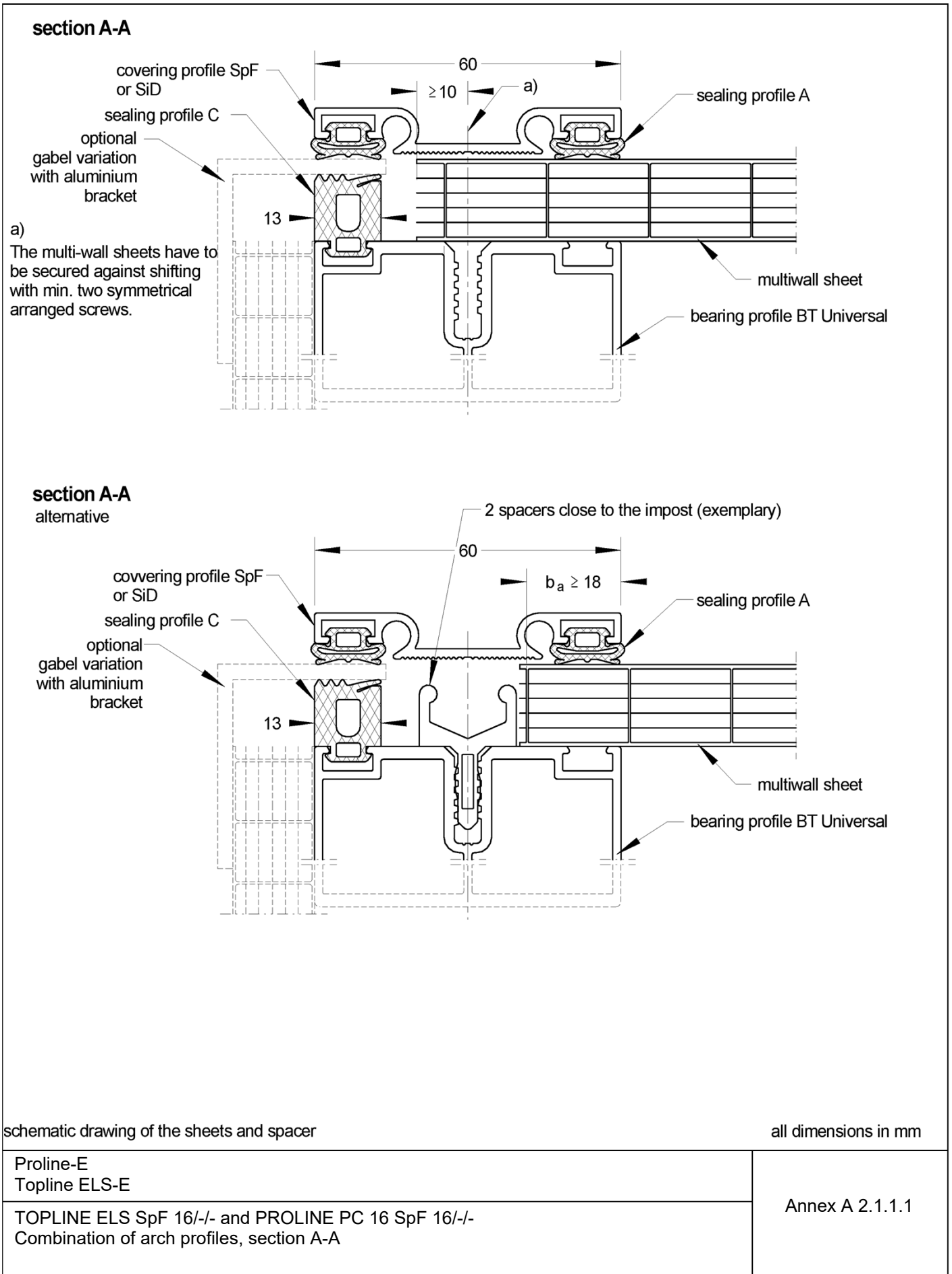
English translation prepared by DIBt



Electronic copy by DIBt: ETA-21/0451

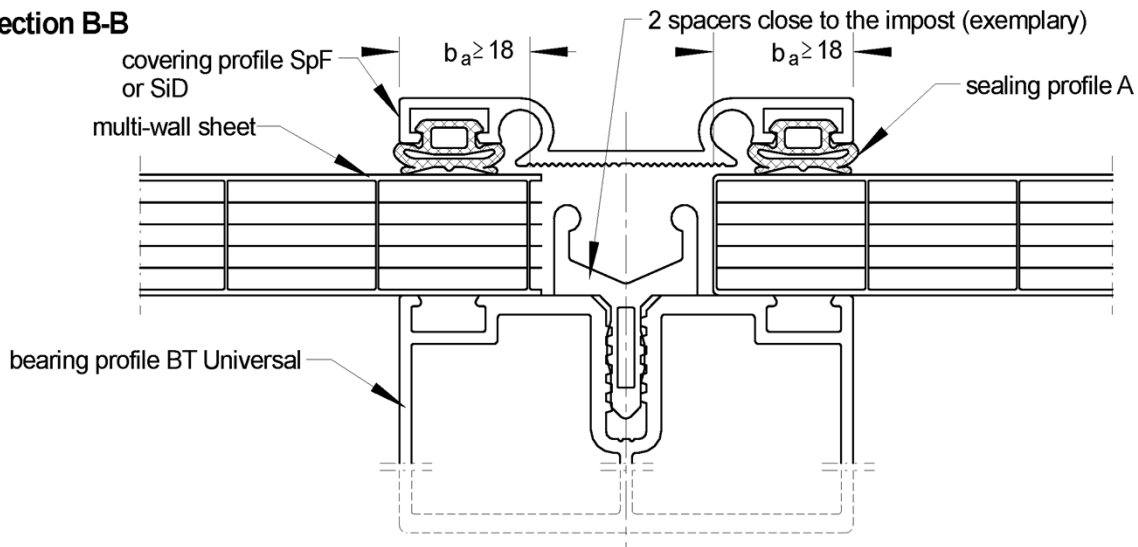
Proline-E Topline ELS-E	Annex A. 1.6
TOPLINE ELS... – and "PROPLINE PC16..." System overview 6-span-system SpF	

English translation prepared by DIBt

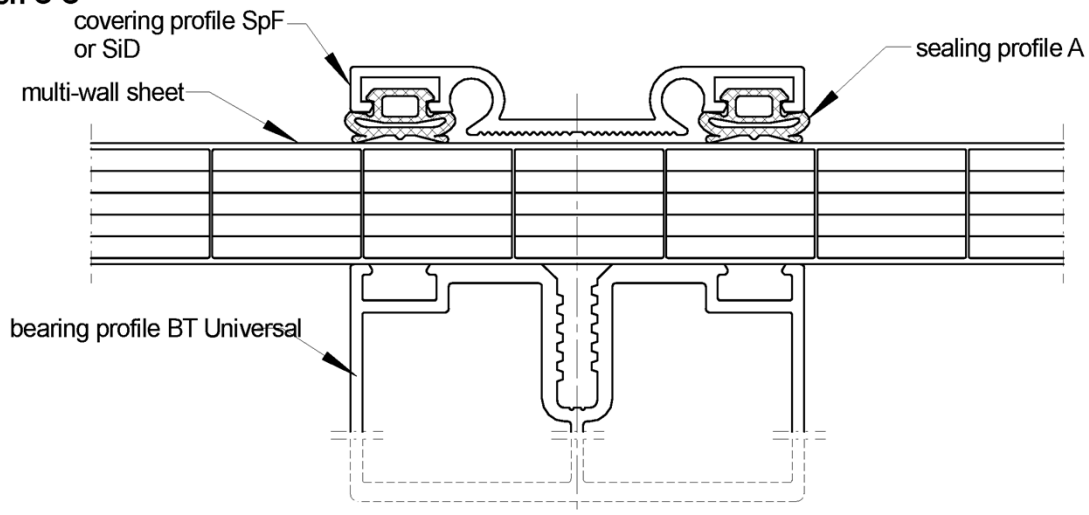


Electronic copy by DIBt: ETA-21/0451

section B-B



section C-C



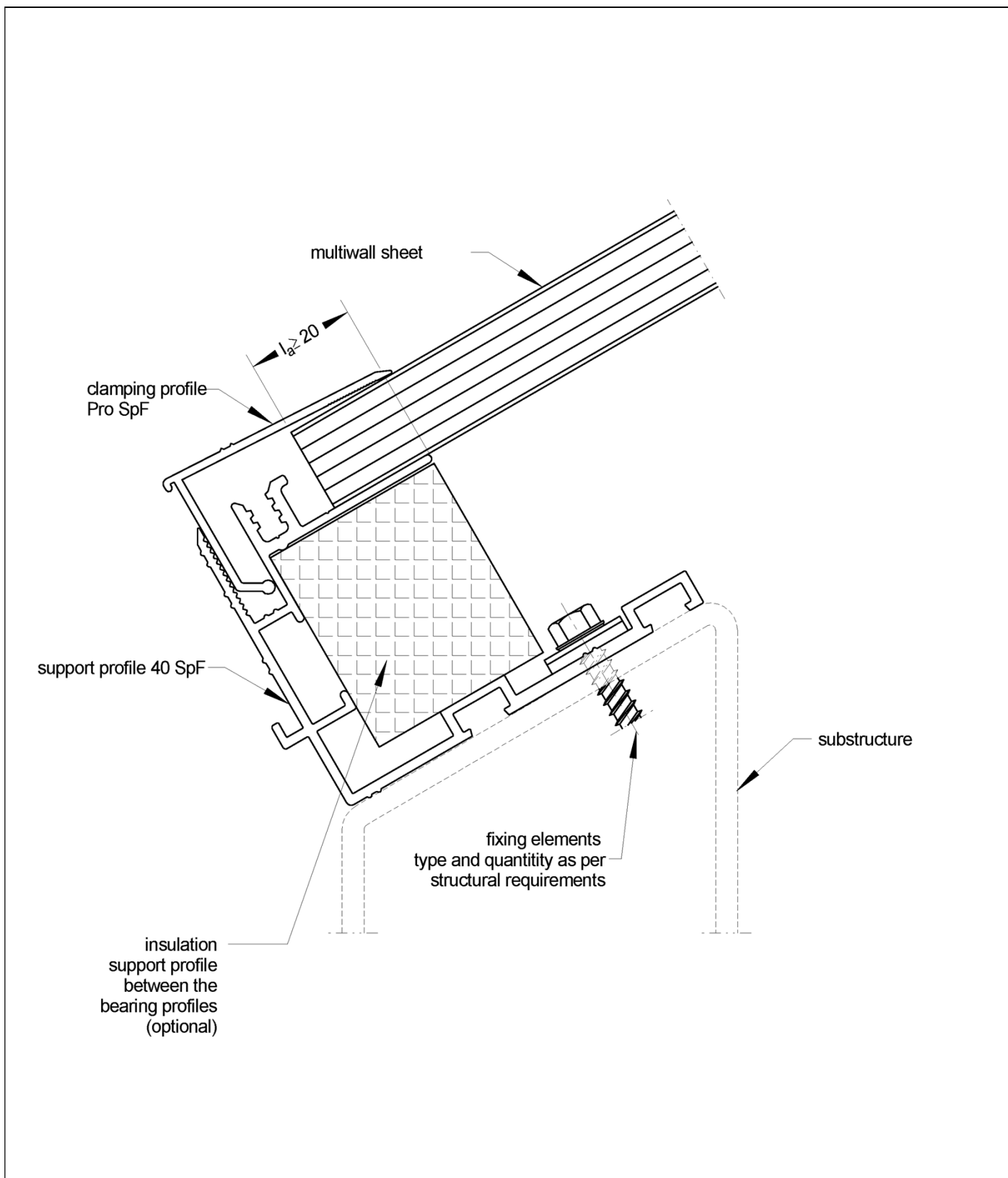
schematic drawing of the sheets and spacer

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/--/-- and PROLINE PC 16 SpF 16/--/--
combination of arch profiles, sections B-B and C-C

Annex A 2.1.1.2



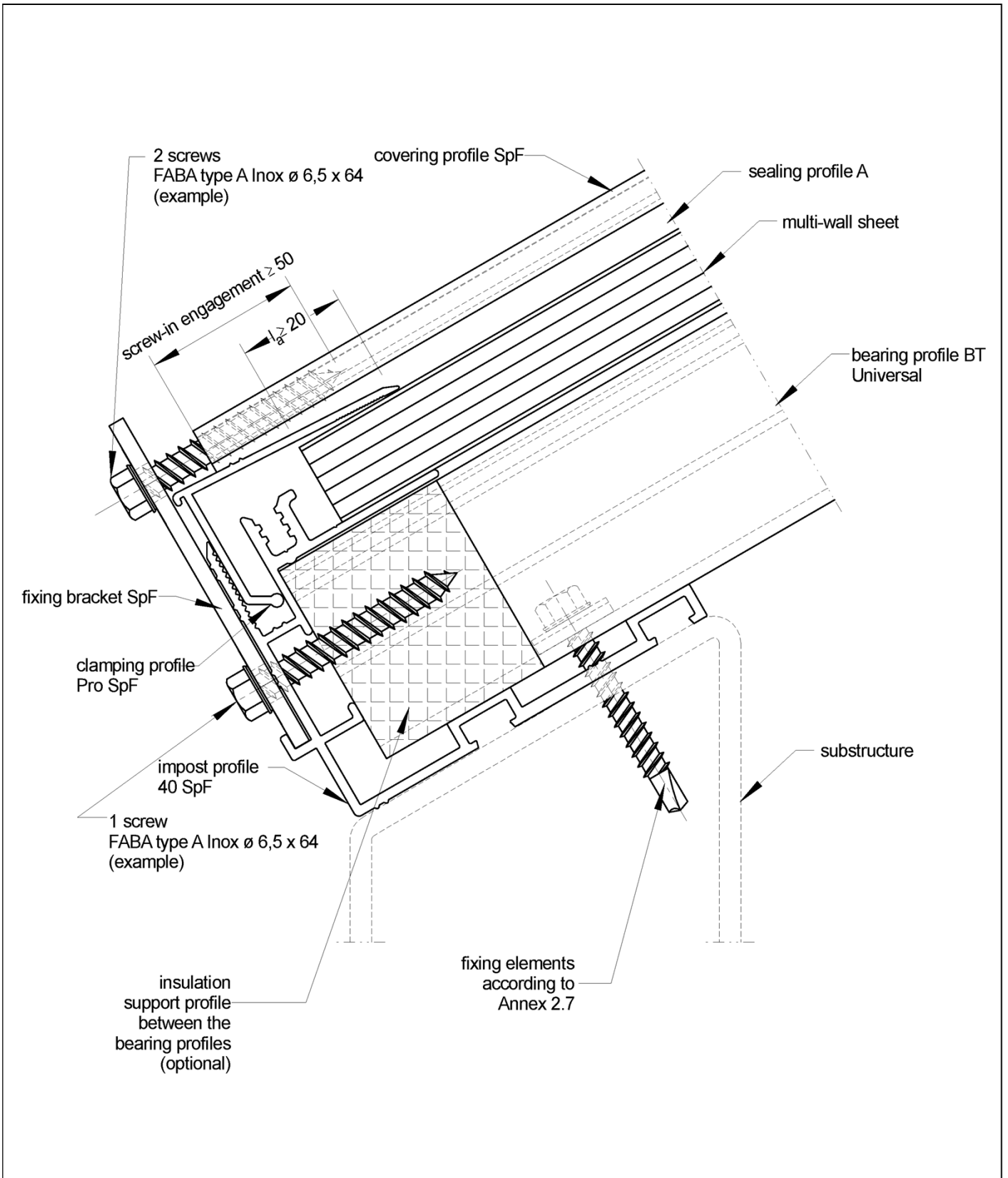
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

PROLINE PC 16 SpF 16/--/--
combination of impost profiles, section D-D

Annex A 2.1.2



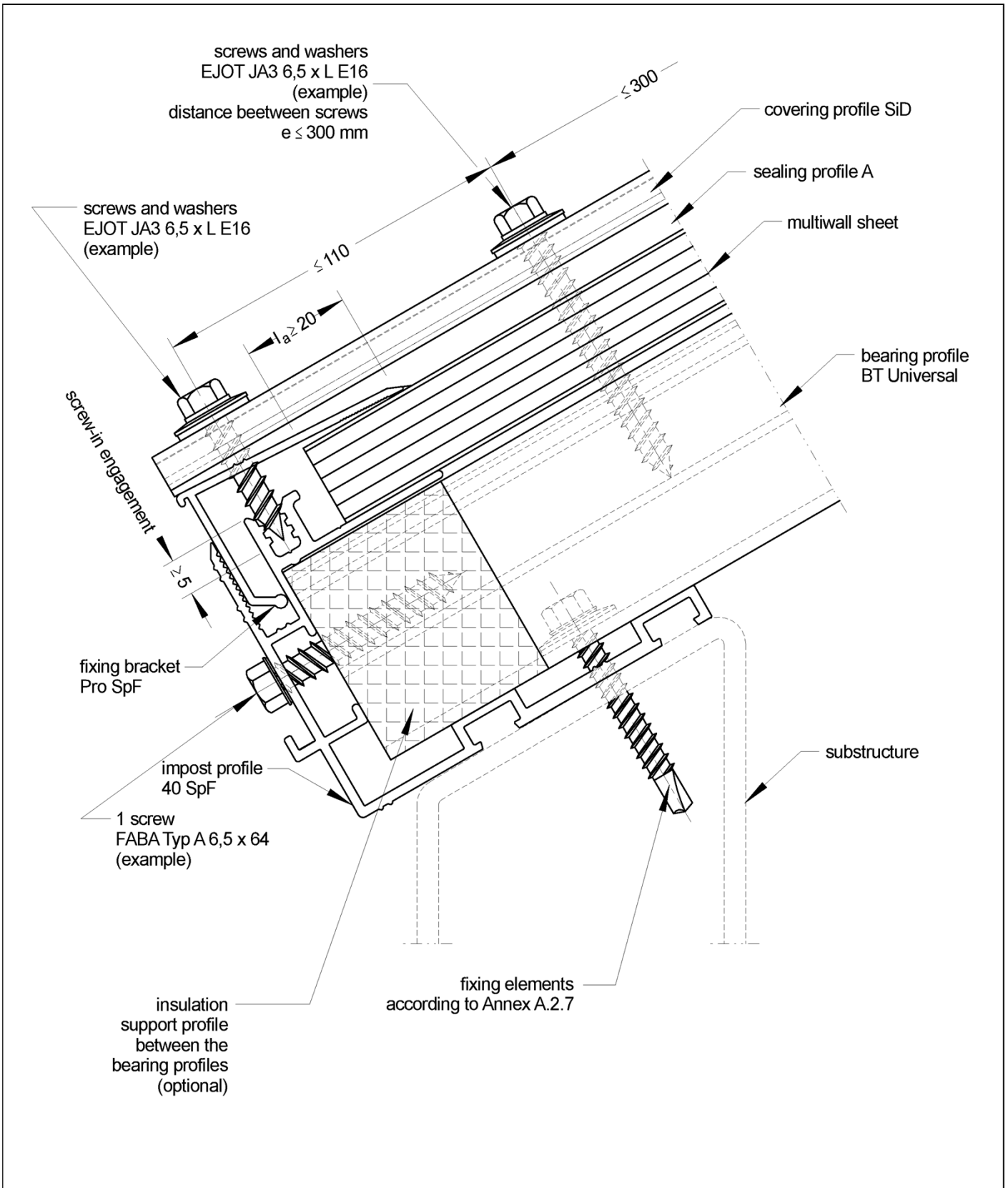
schematic drawing of the sheet

all dimensions in mm

Proline-E
Topline ELS-E

PROLINE PC 16 SpF 16/--/--
combination of impost profiles, section E-E

Annex A 2.1.3.1



schematic drawing of sheet

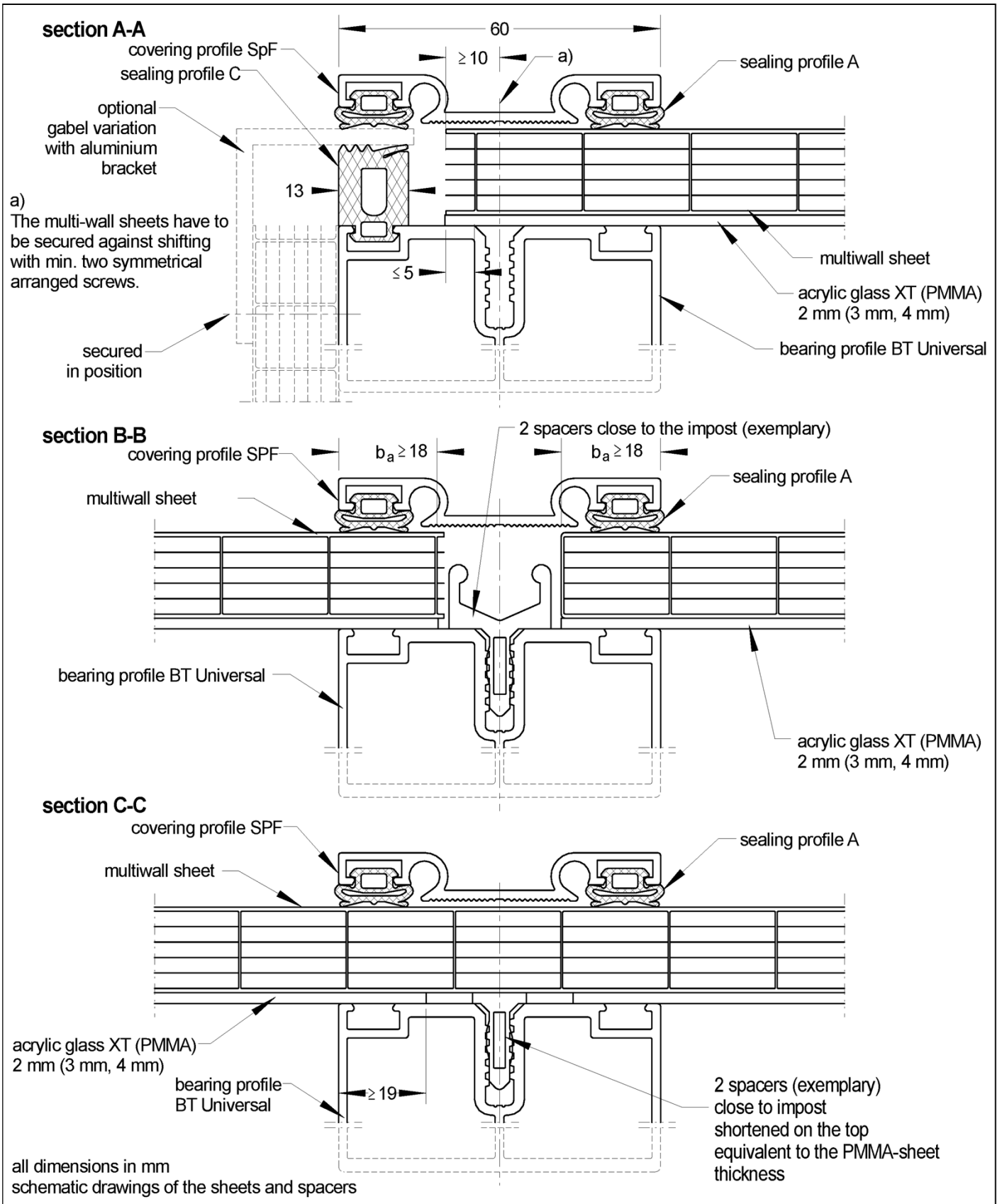
all dimensions in mm

Proline-E
Topline ELS-E

PROLINE PC 16 SiD 16/--/--
combination of impost profiles, section E-E alternative

Annex A 2.1.3.2

English translation prepared by DIBt

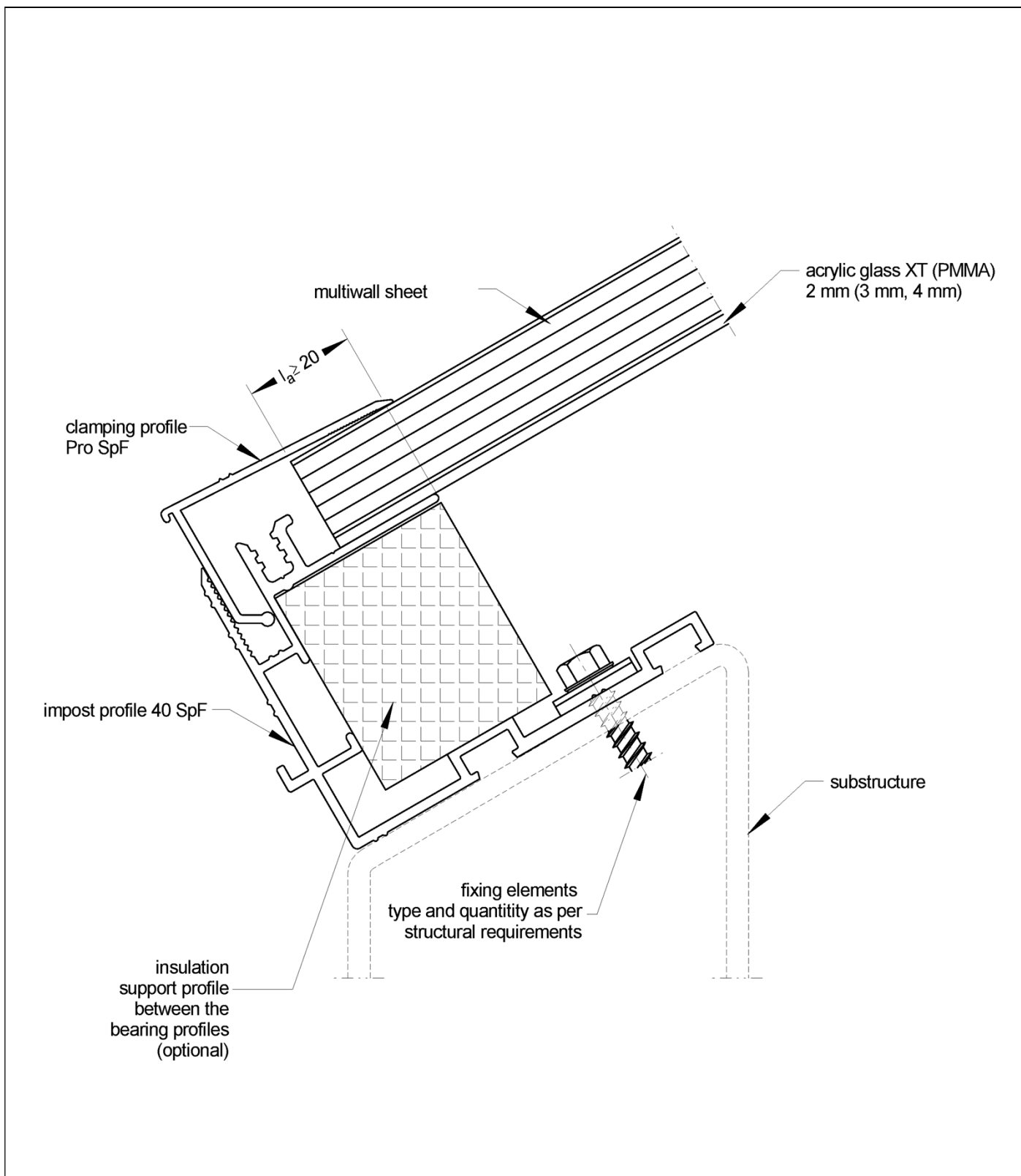


Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

TOPLINE ELS SPF 16/--/-- (ACx) and PROLINE PC 16 SPF 16/--/-- (ACx)
combination of arch profiles, sections A-A, B-B and C-C

Annex A 2.2.1

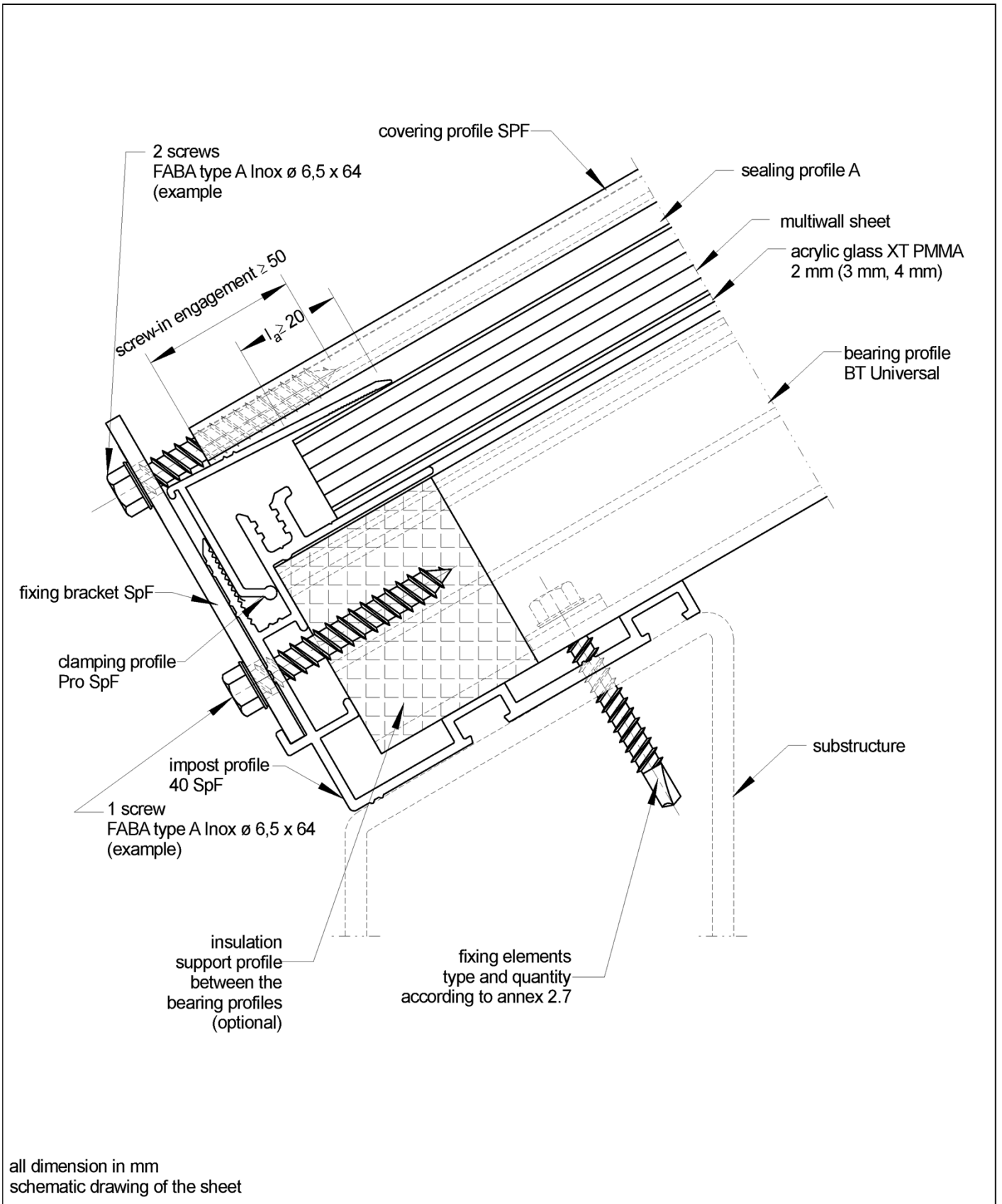


all dimensions in mm
schematic drawing of the sheet

Proline-E
Topline ELS-E

PROLINE PC 16 SpF 16/--/-- (ACx)
combination of impost profiles, section D-D

Annex A 2.2.2



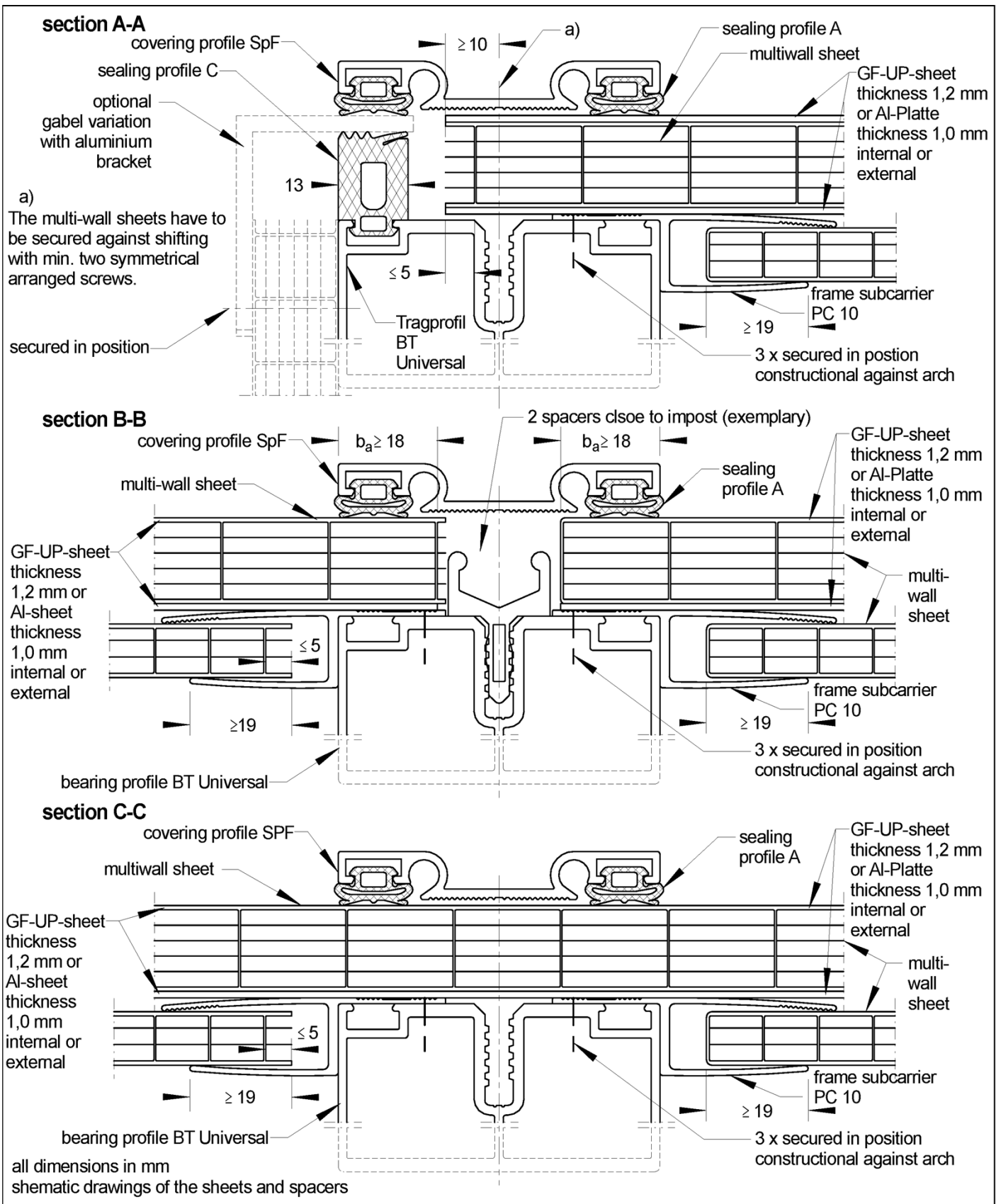
Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

PROLINE PC 16 SpF 16/--/-- (ACx)
combination of impost profiles, section E-E

Annex A 2.2.3

English translation prepared by DIBt

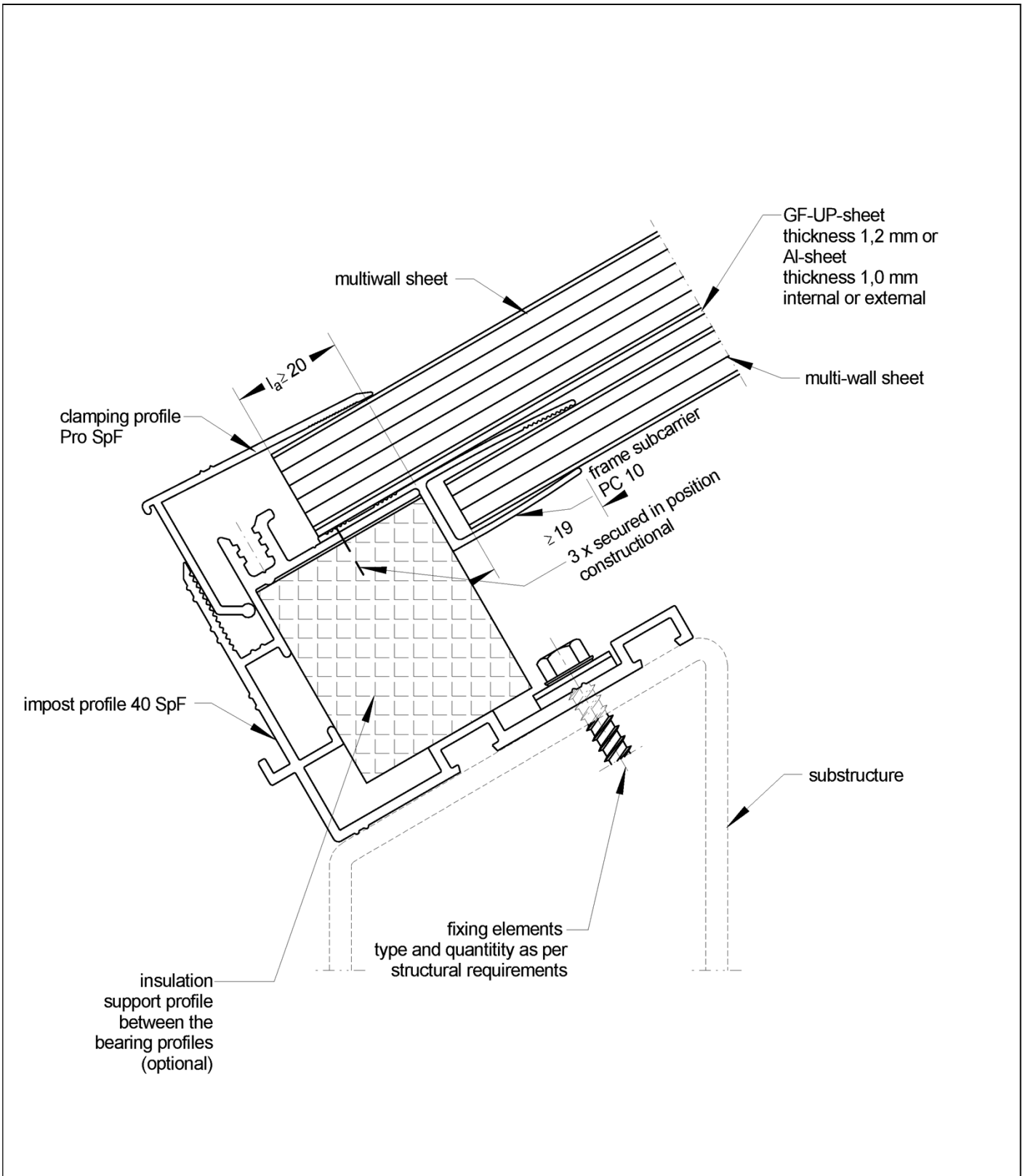


Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

TOPLINE ELS SPF 16/10/-- (HB) and PROLINE PC 16 SPF 16/10/-- (HB)
combination of arch profiles, sections A-A, B-B and C-C

Annex A 2.3.1



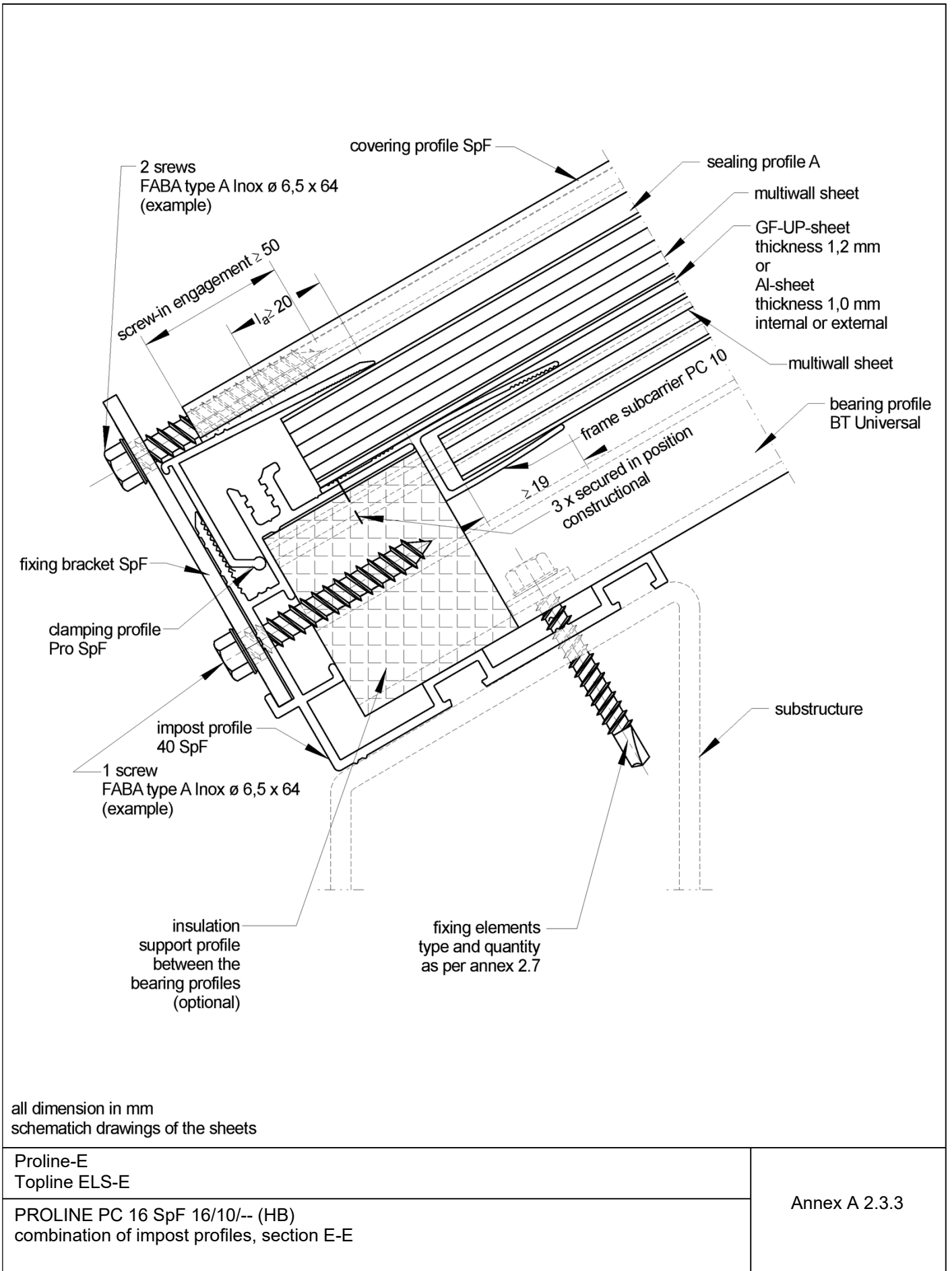
all dimension in mm
schematic drawings of the sheets

Proline-E
Topline ELS-E

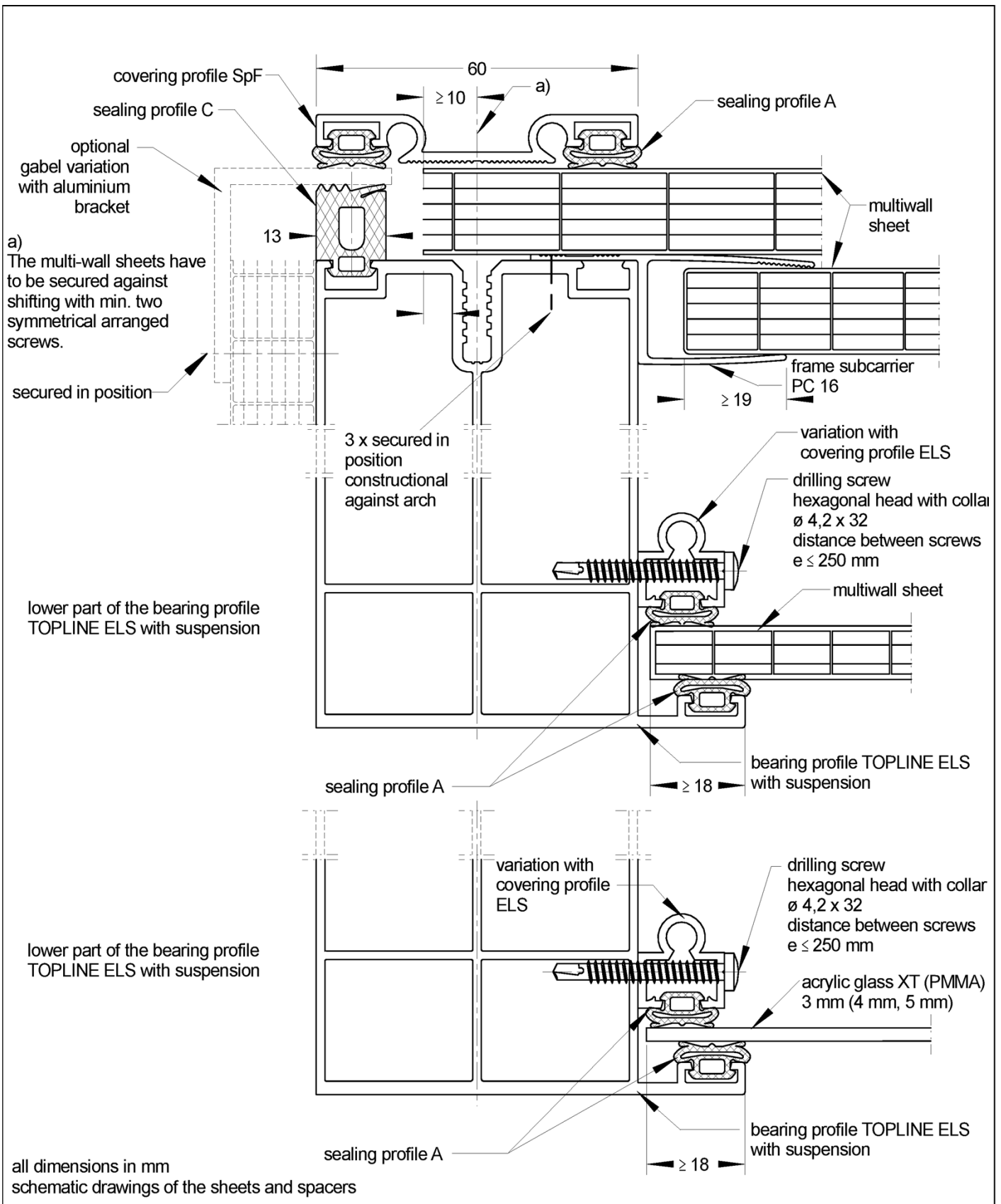
TOPLINE ELS SPF 16/10/-- (HB) and PROLINE PC 16 SPF 16/10/-- (HB)
combination of impost profiles, section D-D

Annex A 2.3.2

Electronic copy by DIBt: ETA-21/0451



English translation prepared by DIBt



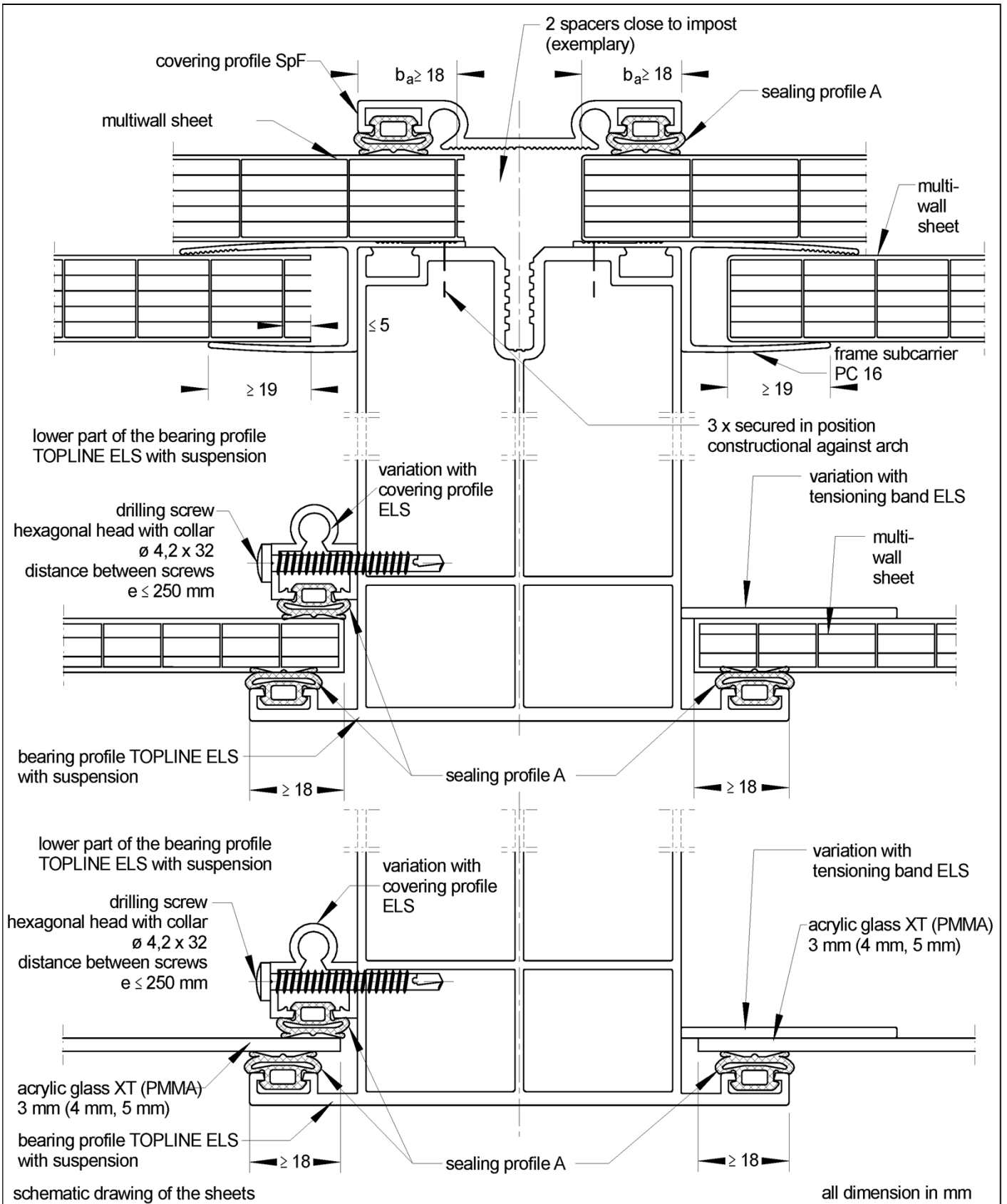
Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/10 and TOPLINE ELS SpF 16/16/ACx
combination of arch profiles, section A-A

Annex A 2.4.1.1

English translation prepared by DIBt



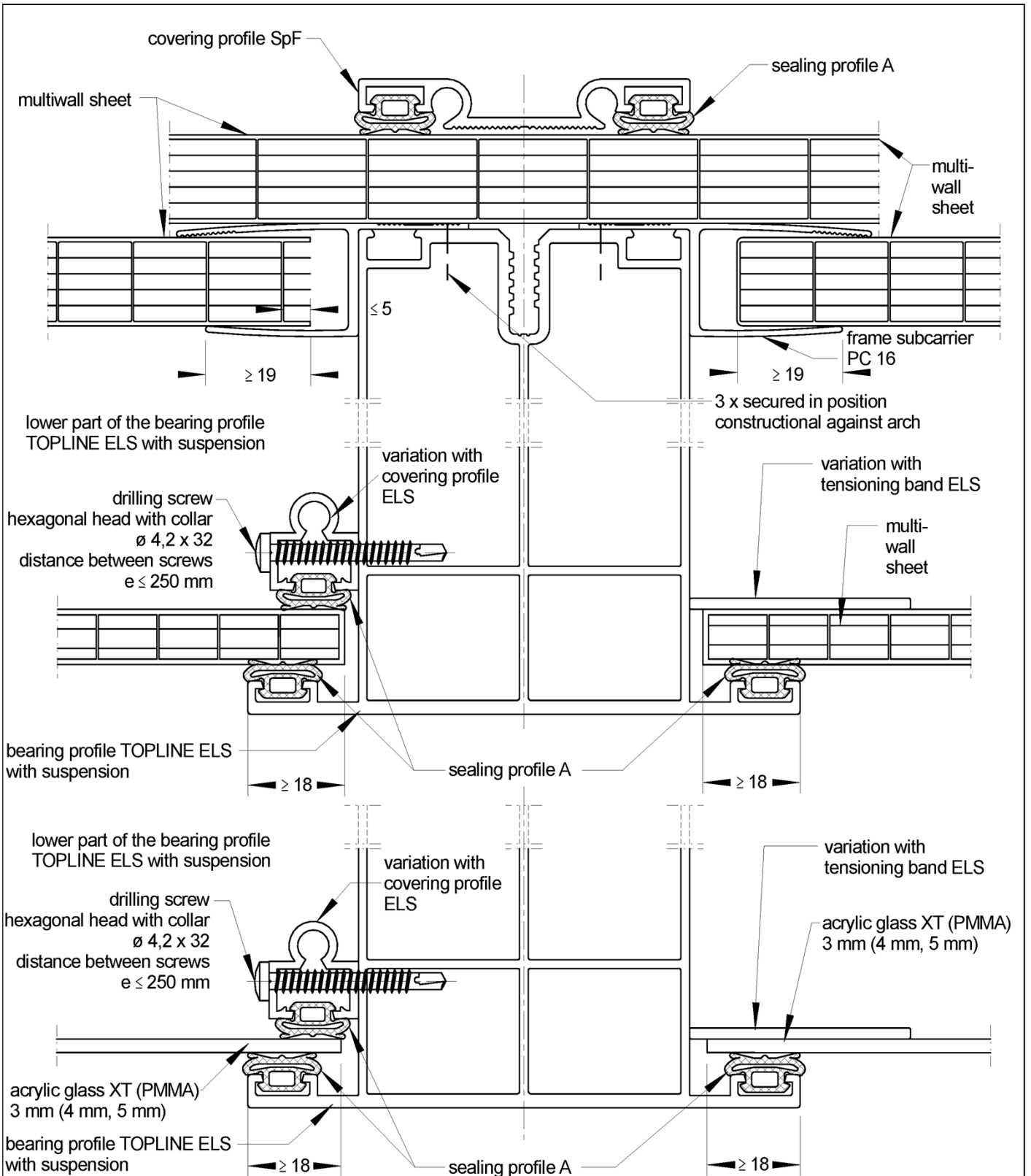
Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/10 and TOPLINE ELS SpF 16/16/ACx
combination of arch profiles, section B-B

Annex A 2.4.1.2

English translation prepared by DIBt



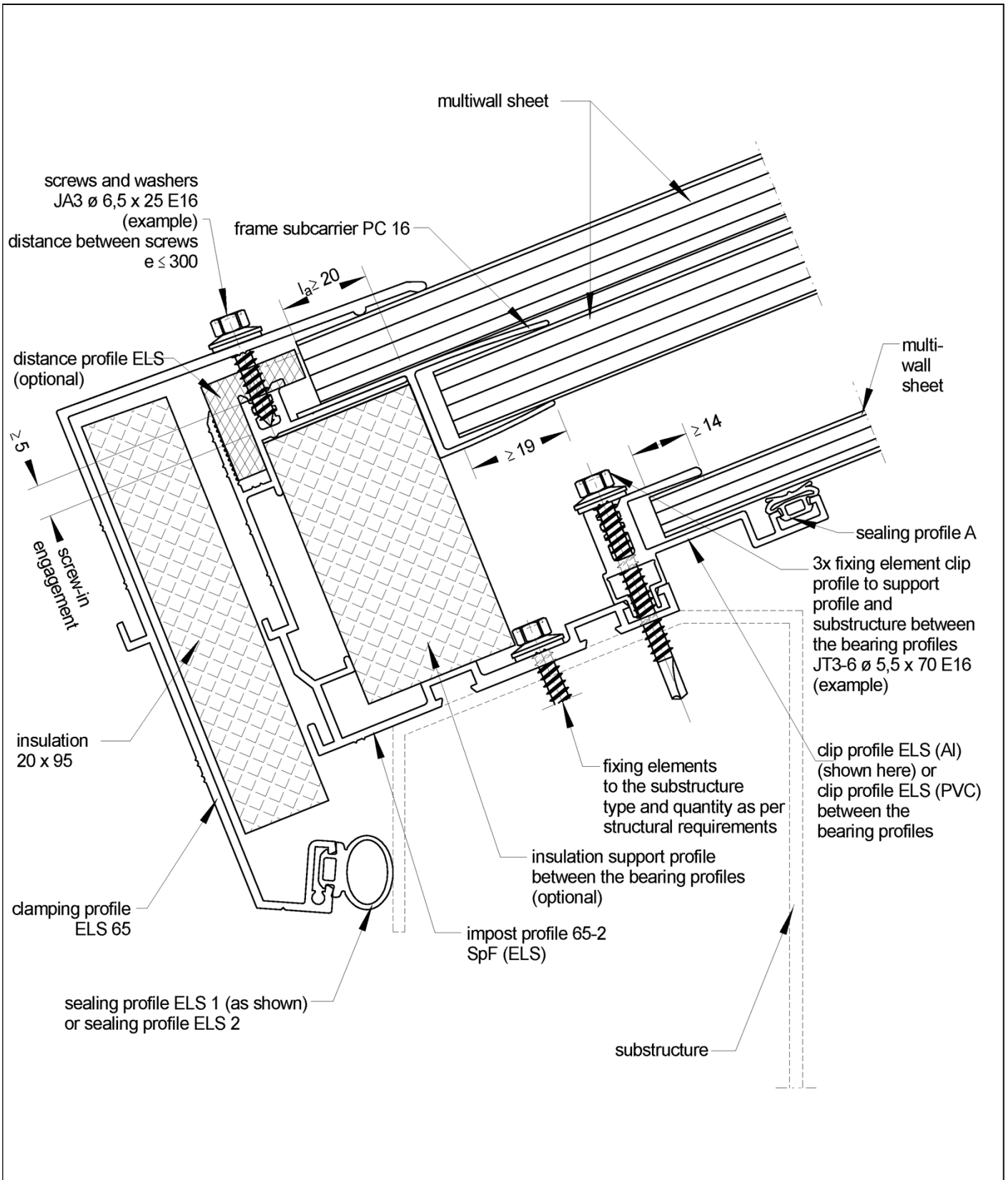
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/10 and TOPLINE ELS SpF 16/16/ACx
combination of arch profiles, section C-C

Annex A 2.4.1.3



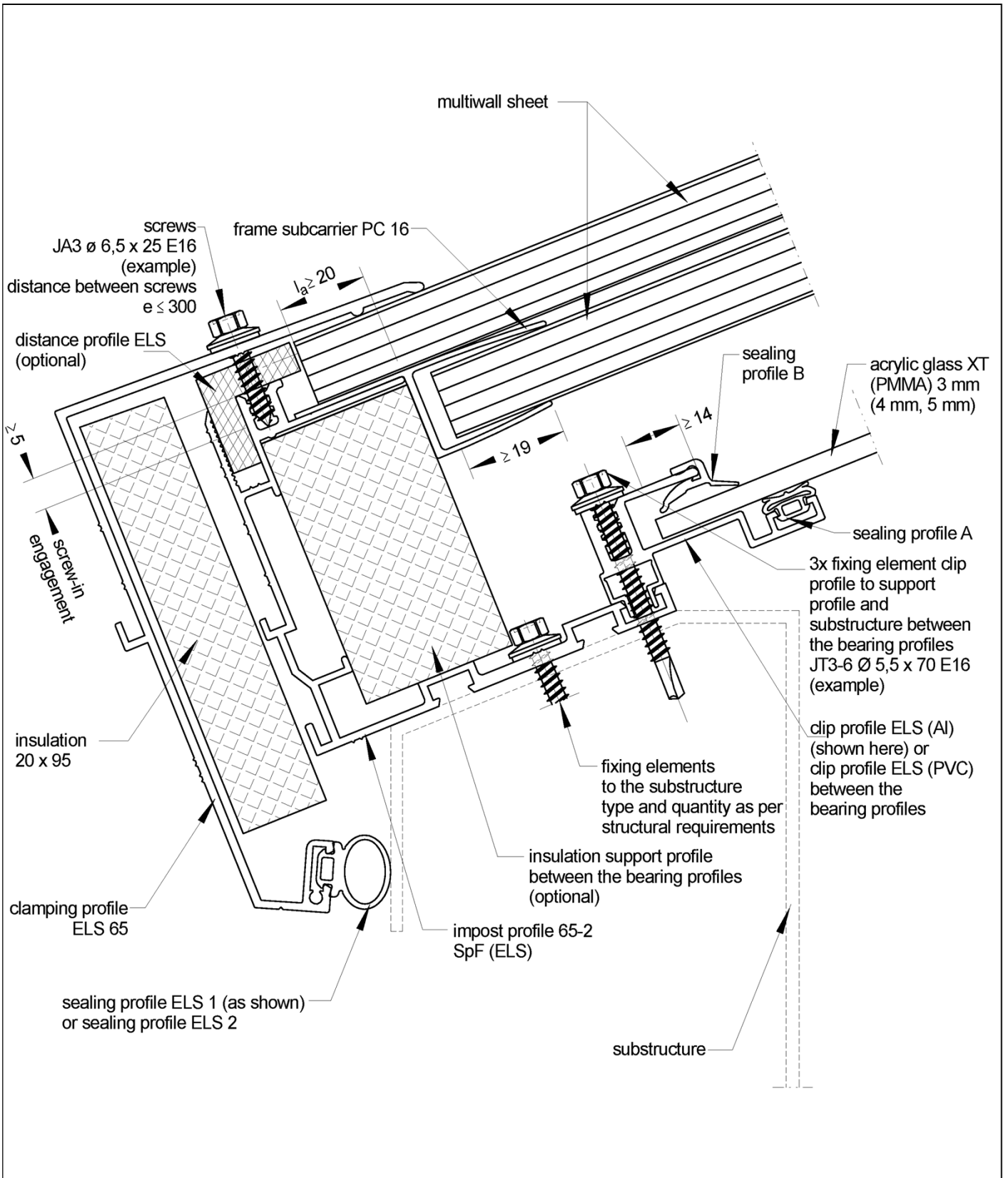
schematic drawing of the sheets

all dimension in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/10
combination of impost profiles, section D-D

Annex A 2.4.2.1



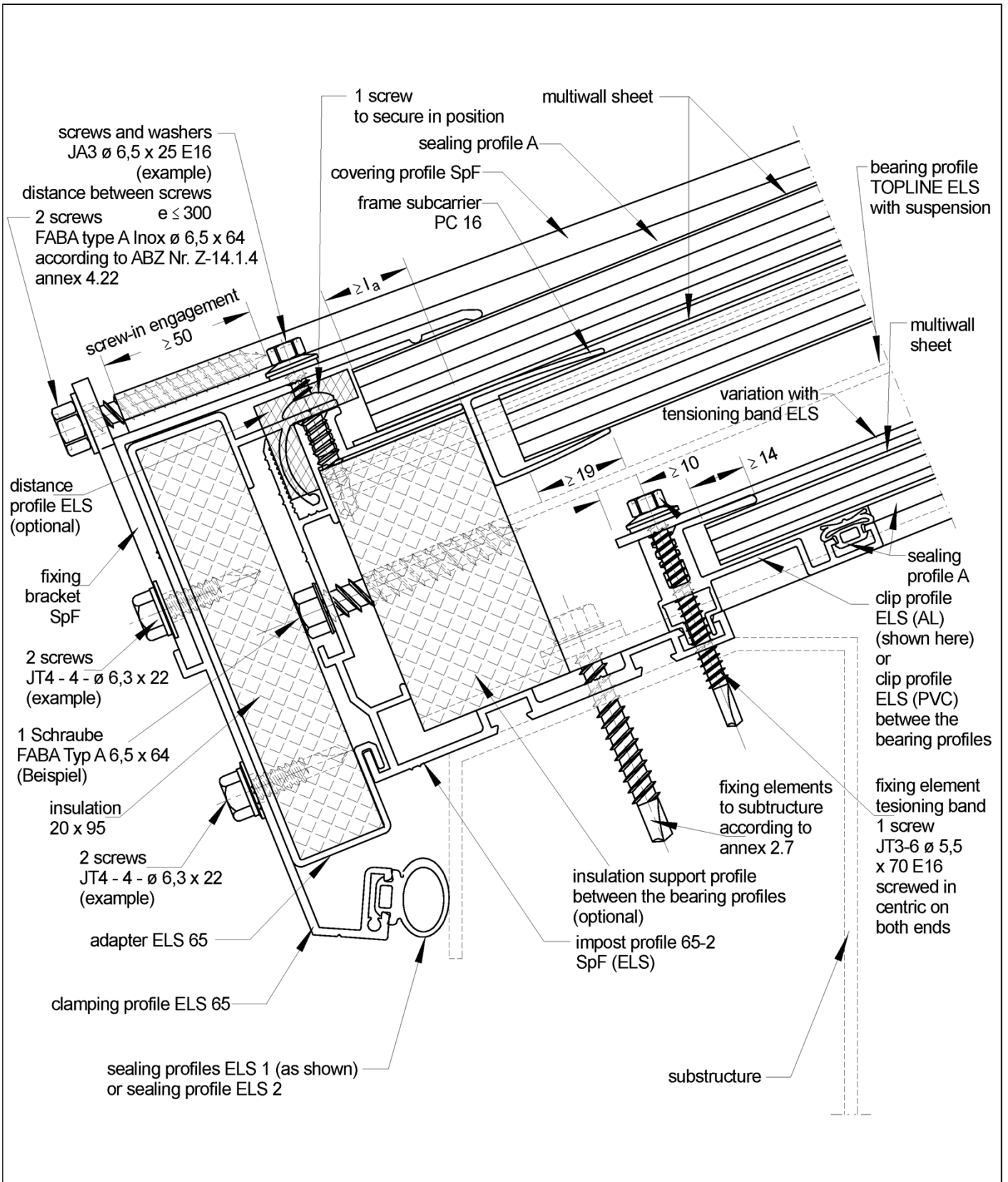
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/ACx
combination of impost profiles, section D-D

Annex A 2.4.2.2



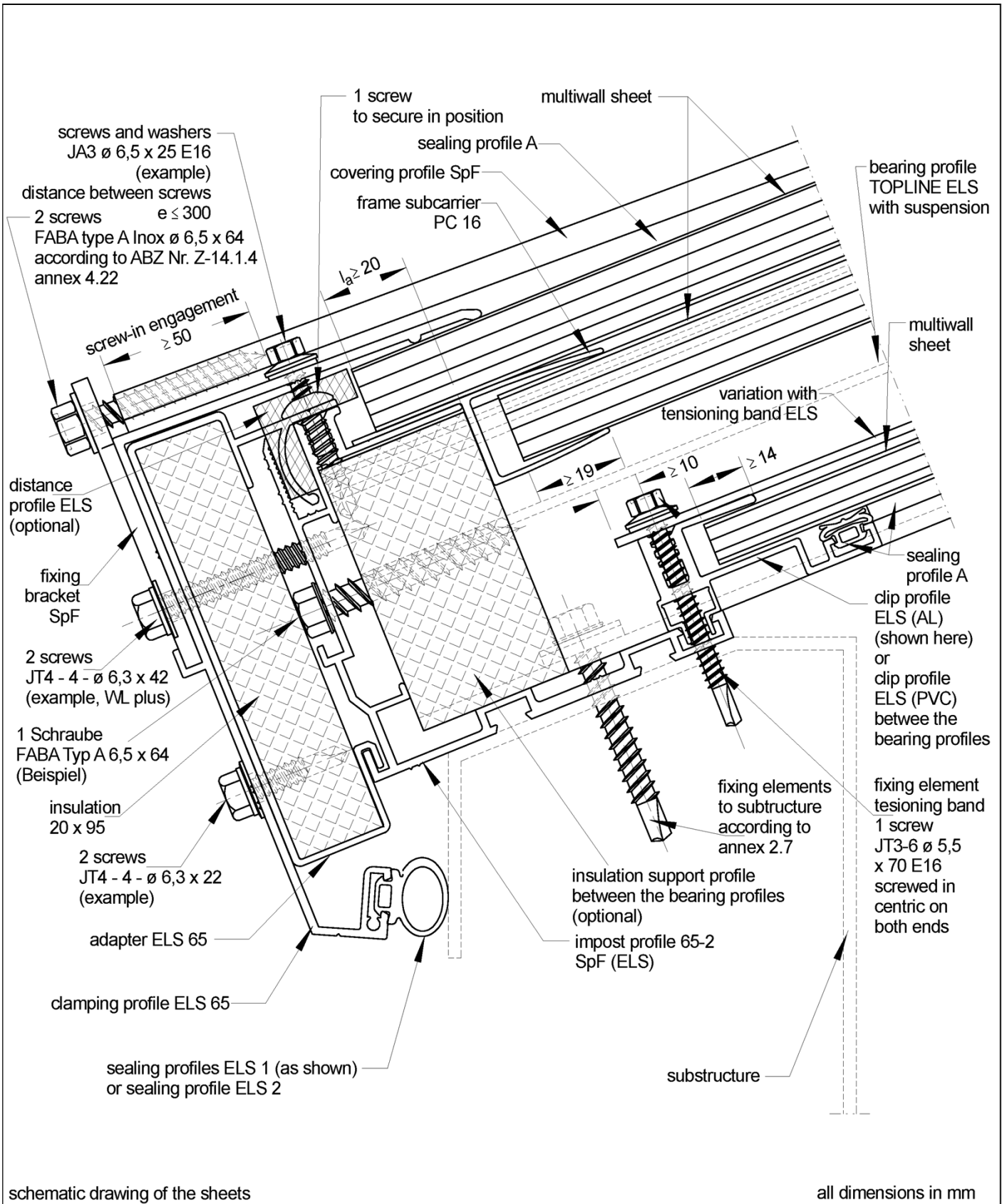
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/10
combination of impost profiles, section E-E

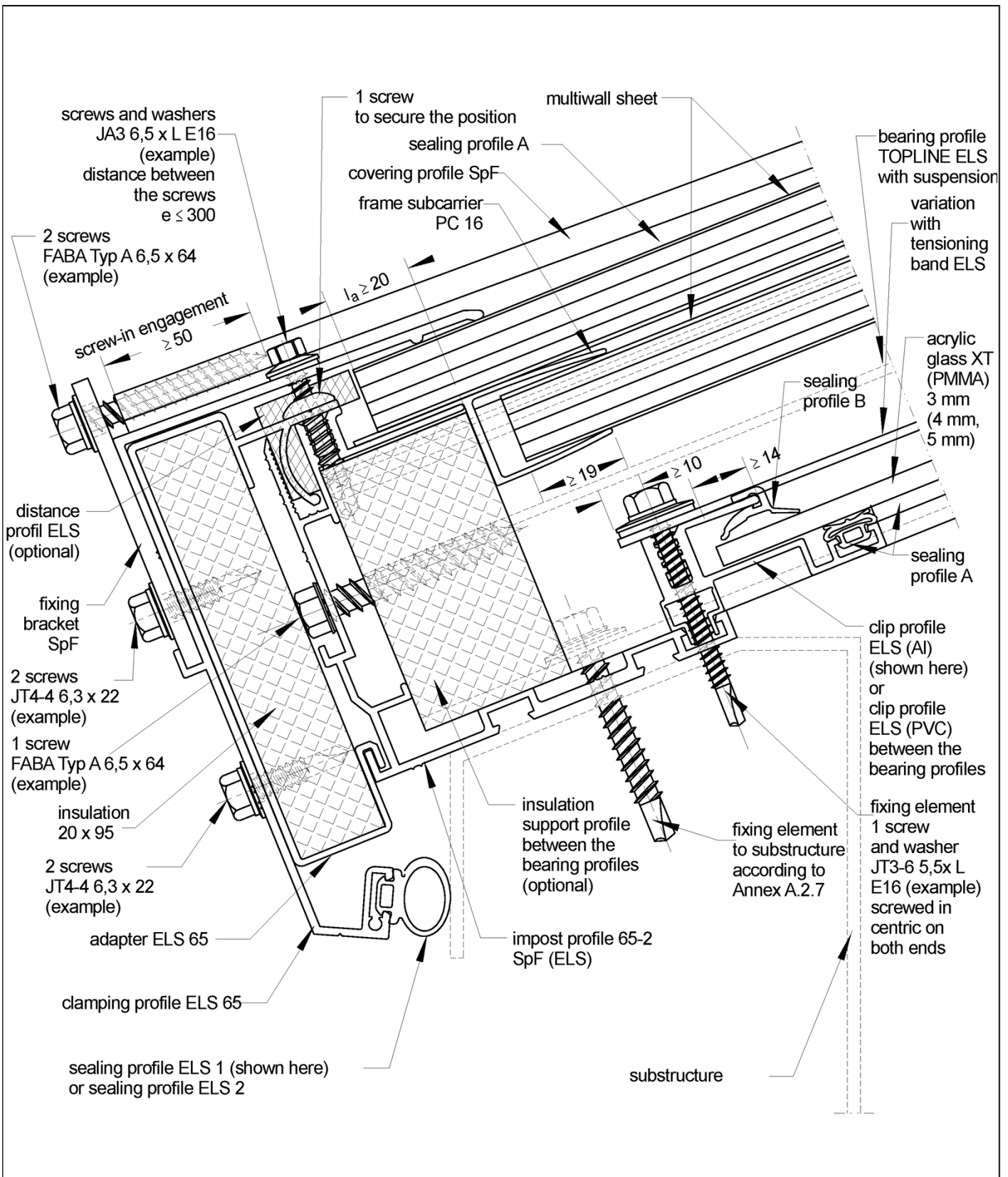
Annex A 2.4.3.1



Electronic copy by DIBt: ETA-21/0451

Proline-E Topline ELS-E	Annex A 2.4.3.2
TOPLINE ELS SpF 16/16/10 WL plus combination of impost profiles, section E-E	

English translation prepared by DIBt



schematic drawings of the sheets

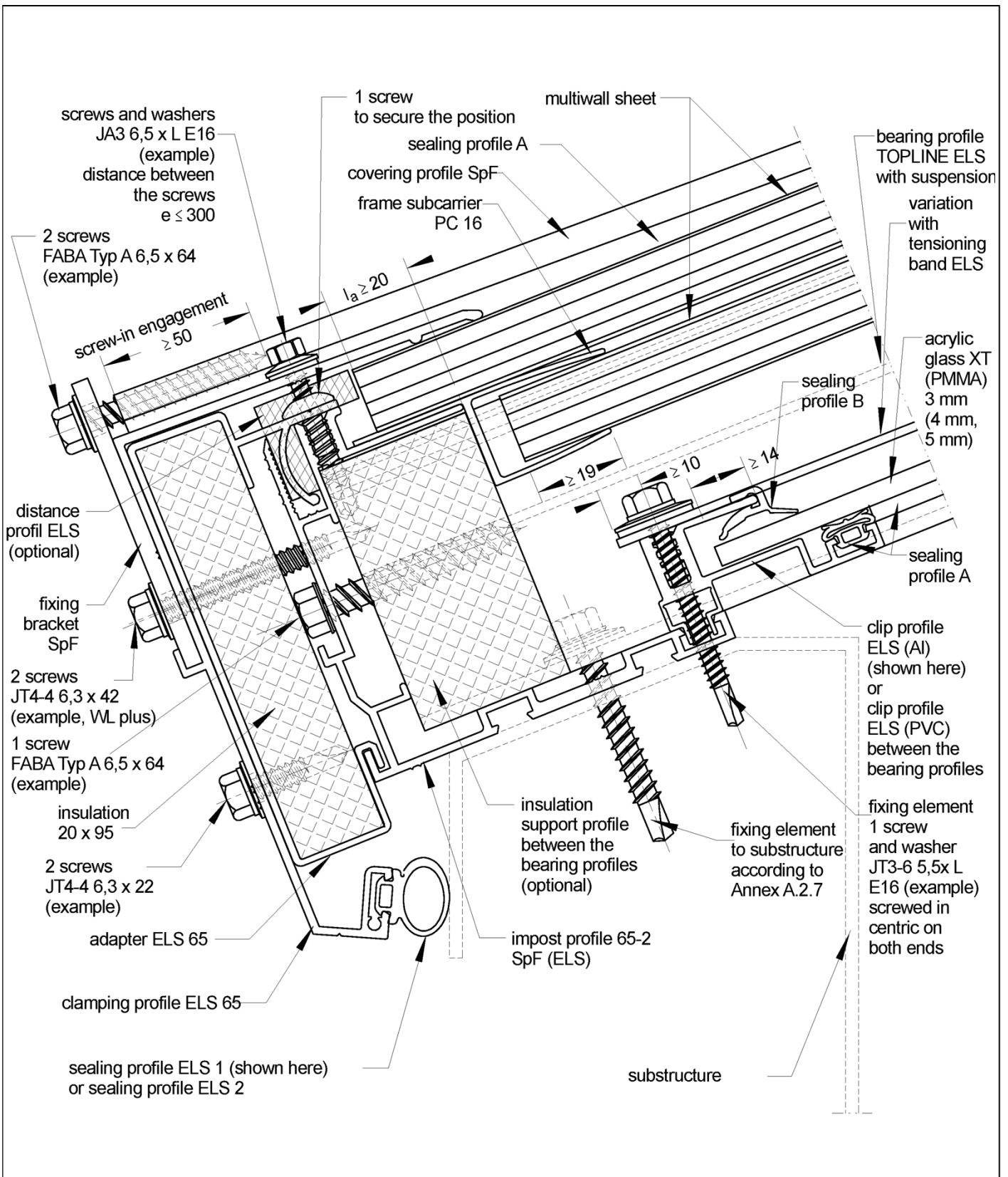
all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/ACx
combination of impost profile, section E-E

Annex A 2.4.3.3

English translation prepared by DIBt



schematic drawing of the sheets

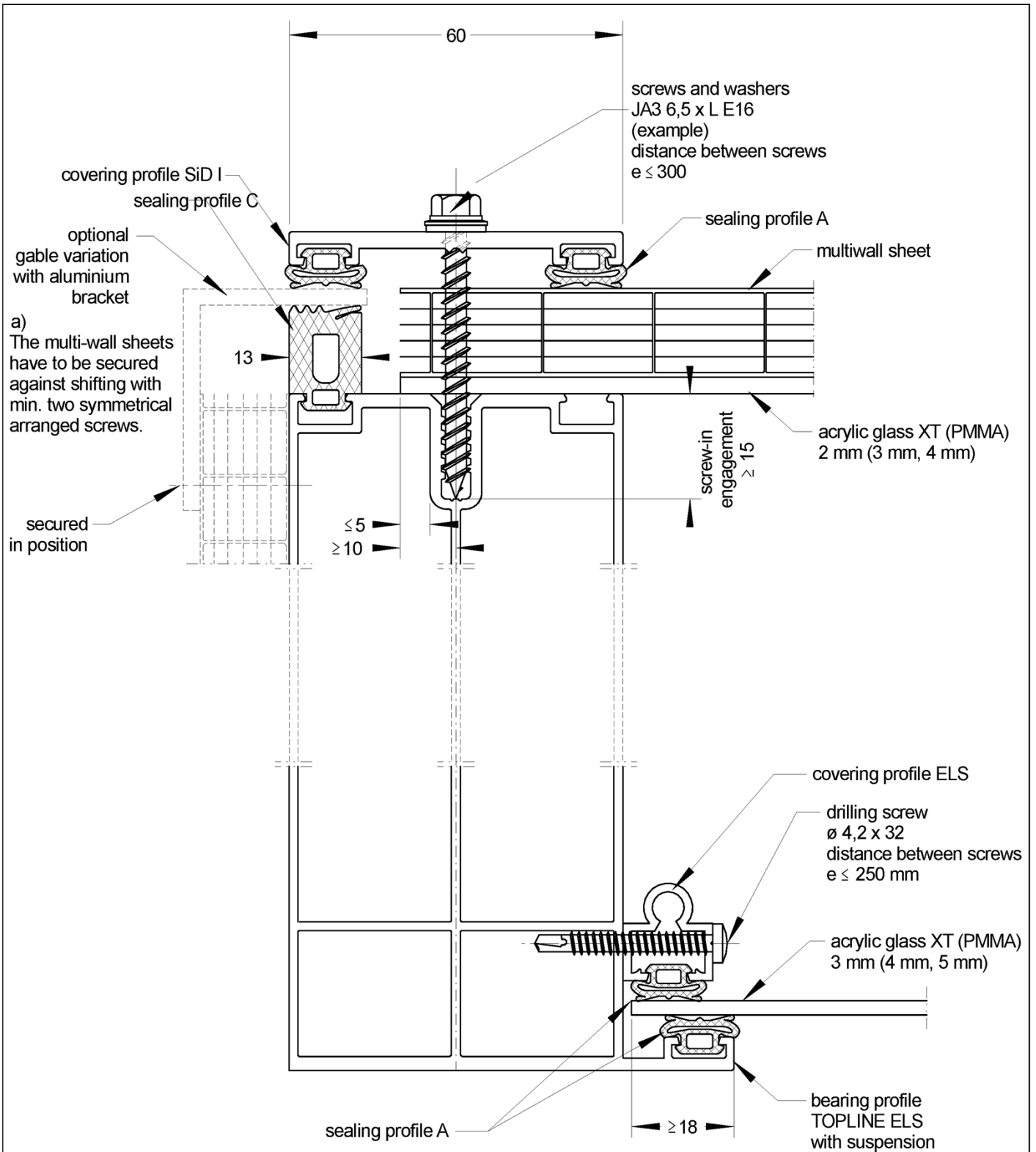
all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SpF 16/16/ACx WL plus
combination of impost profiles, section E-E

Annex A 2.4.3.4

English translation prepared by DIBt



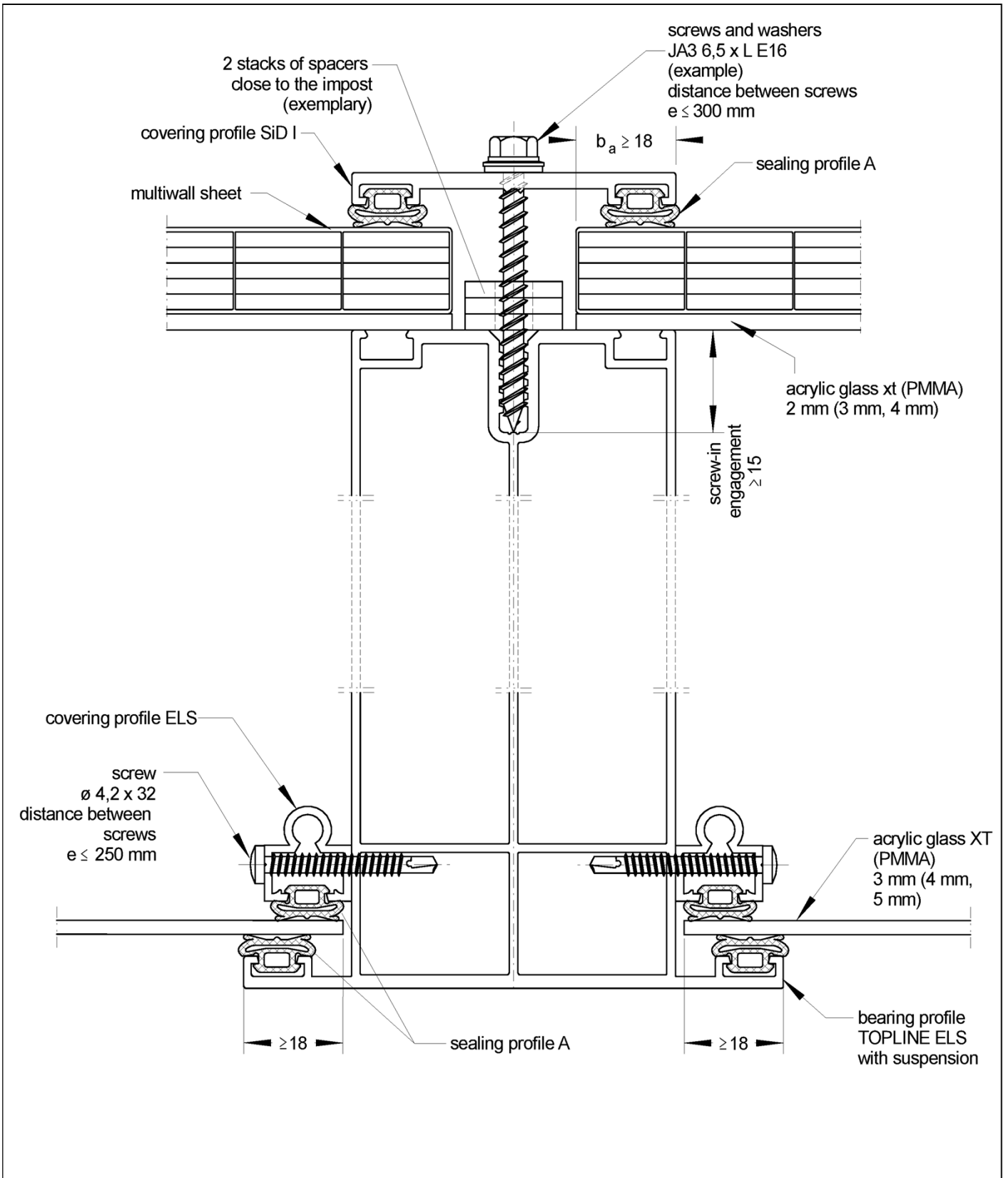
schematic drawing of the sheets and spacers

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD I 16/--/ACx (ACx)
combination of arch profiles, section A-A

Annex A 2.5.1.1



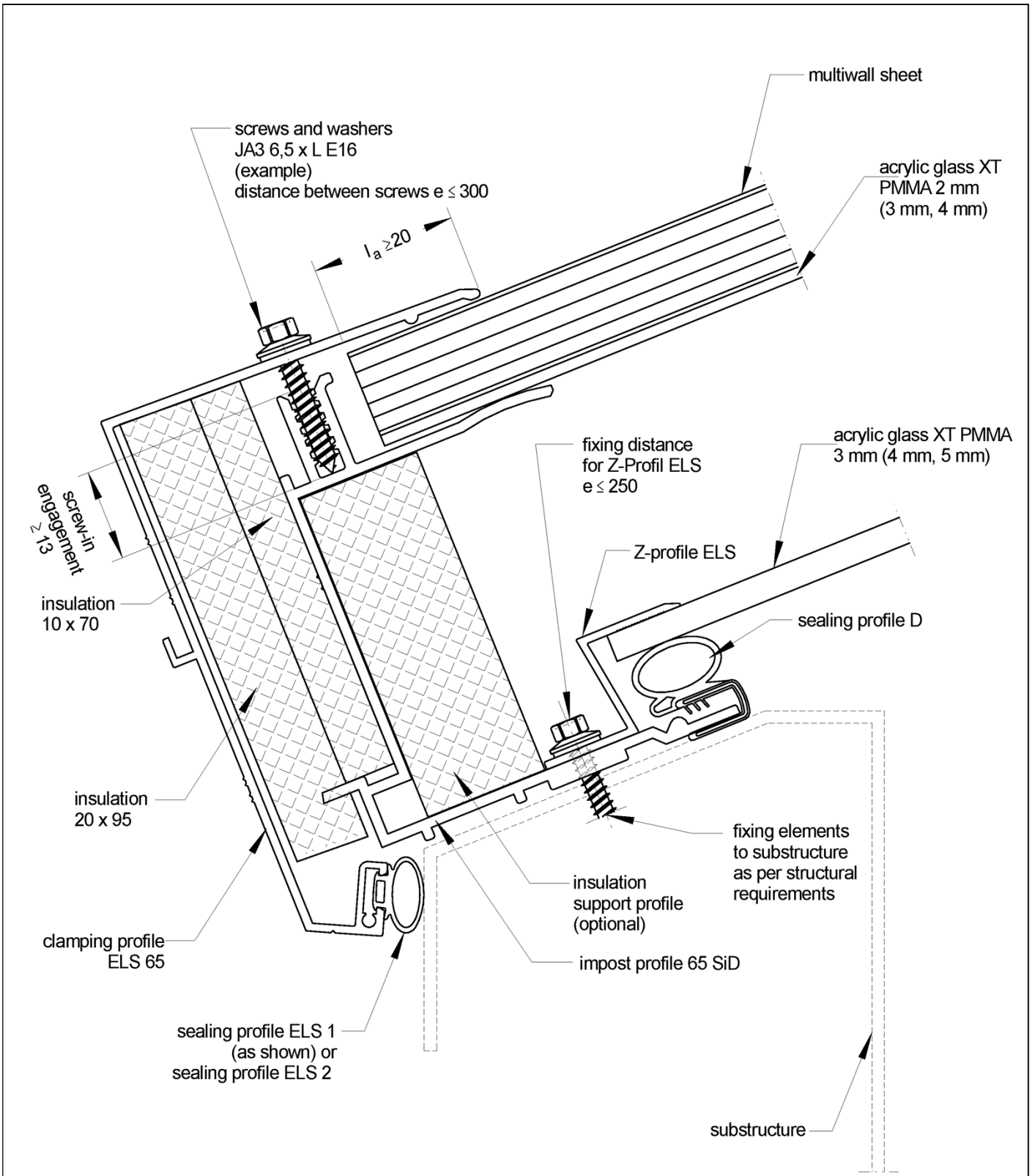
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD I 16/--/ACx (ACx)
combination of arch profiles, section B-B

Annex A 2.5.1.2



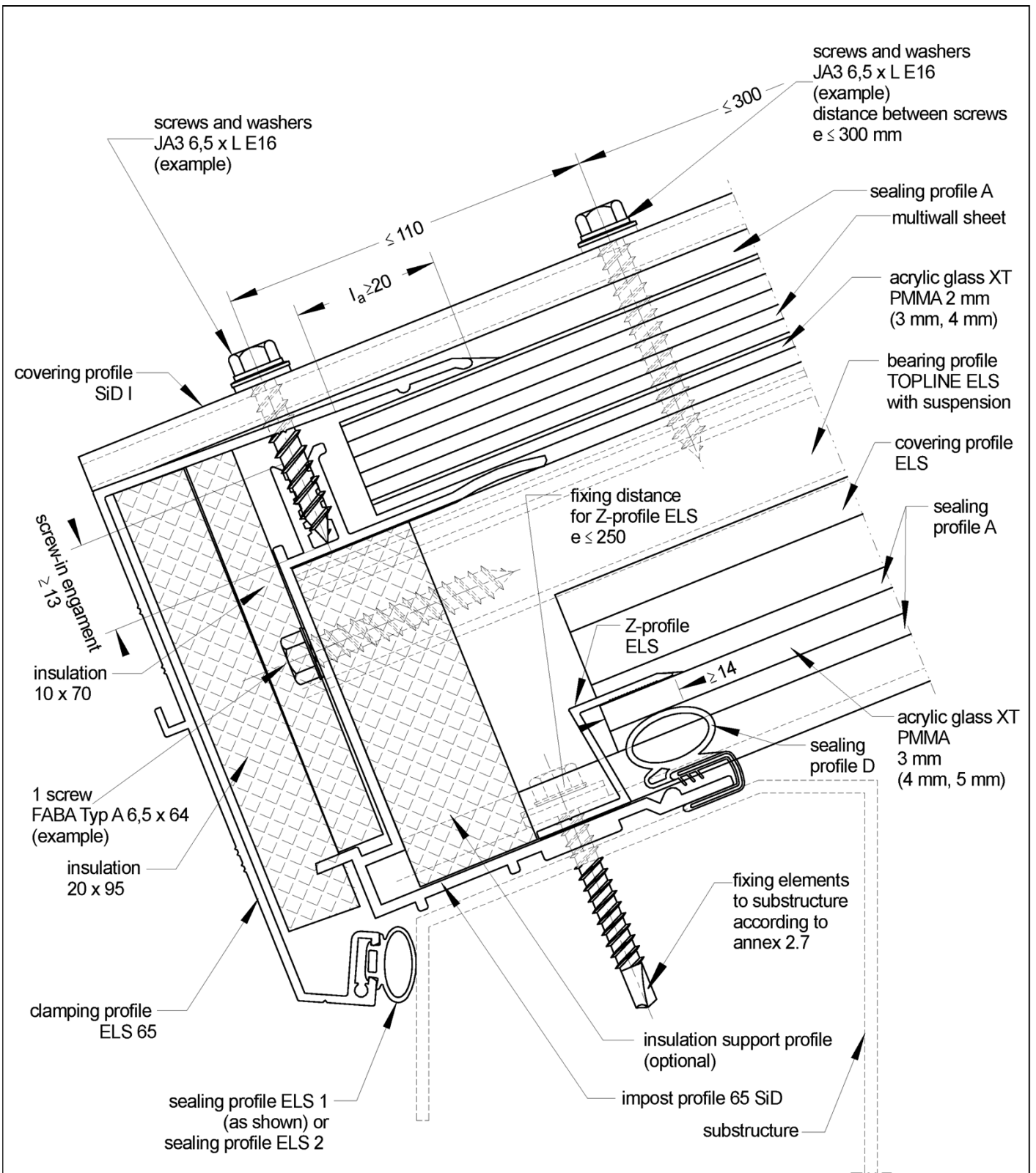
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD I 16/--/ACx (ACx)
combination of impost profiles, section D-D

Annex A 2.5.2



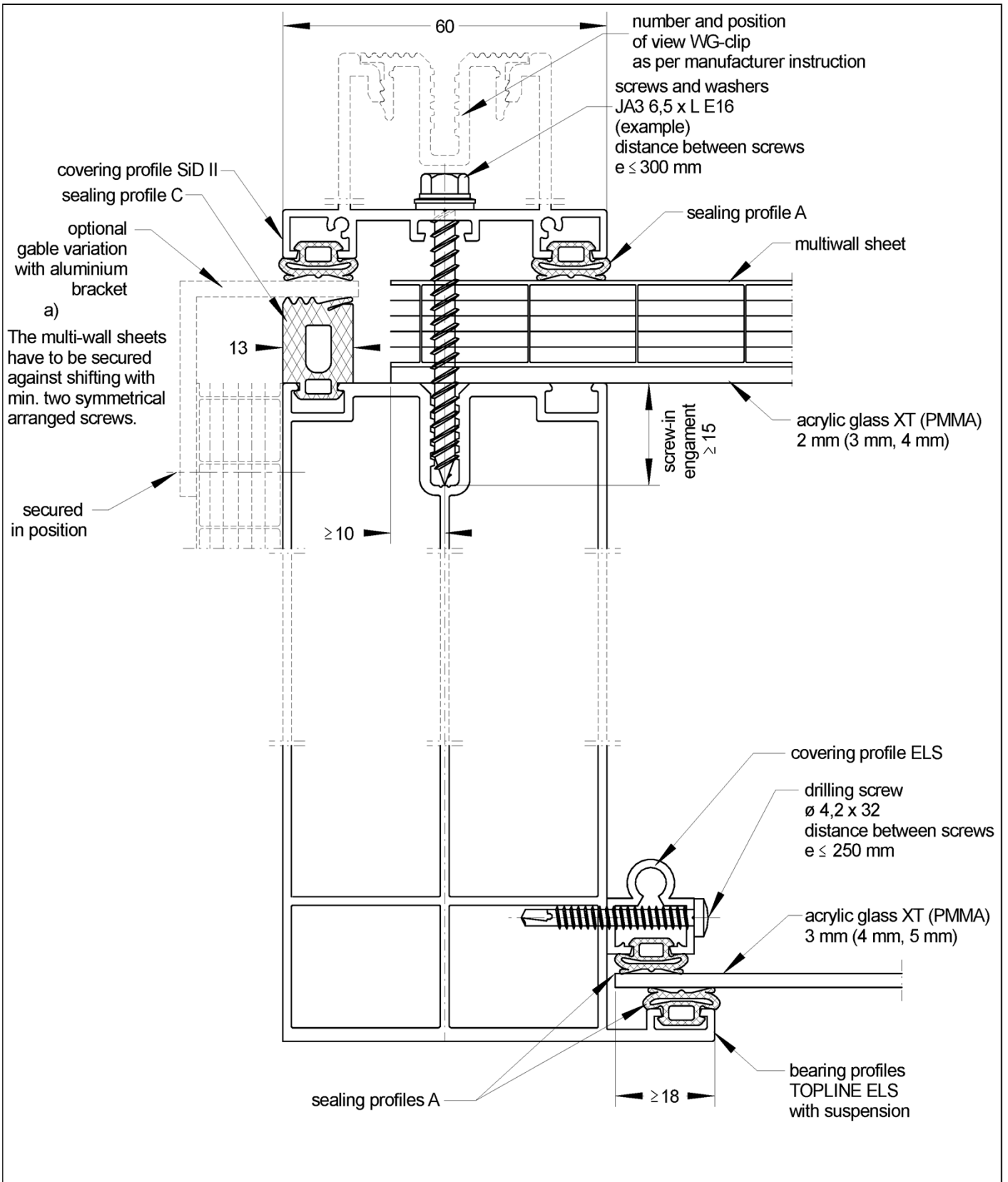
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD I 16/--/ACx (ACx)
combination of impost profiles, section E-E

Annex A 2.5.3



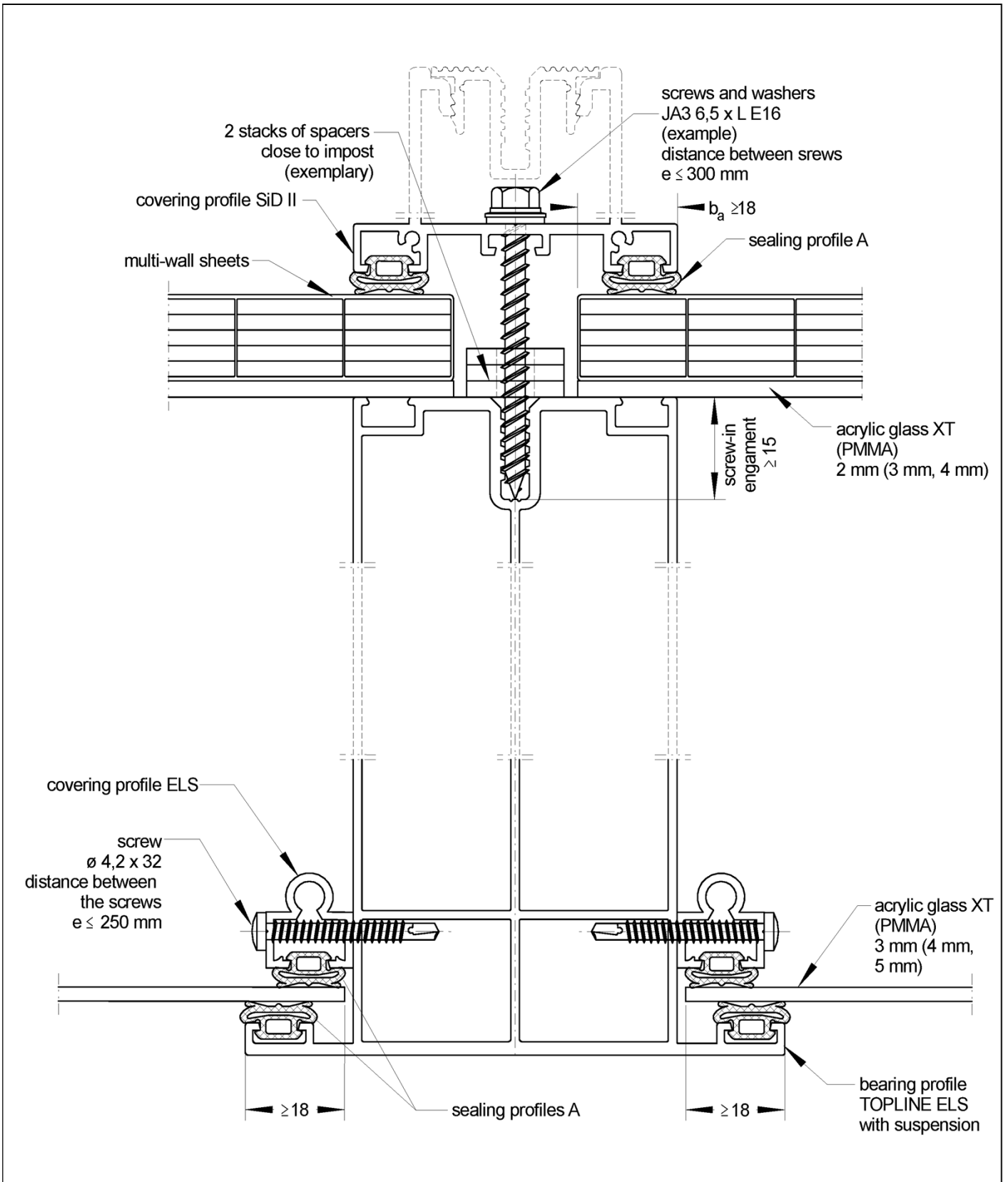
schematic drawings of the sheets and spacers

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD II 16/--/ACx (ACx)
combination of arch profiles, section A-A

Annex A 2.6.1.1



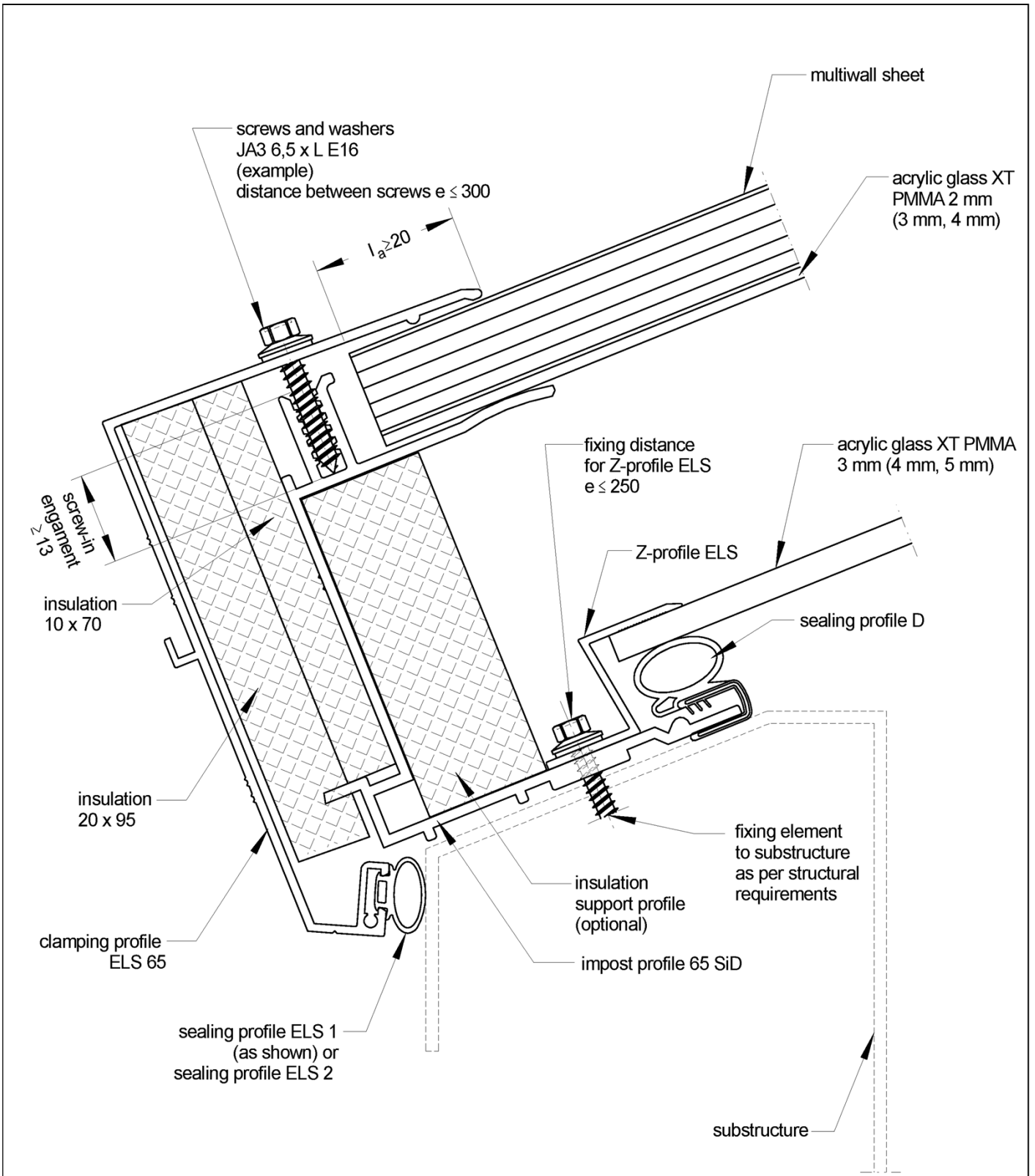
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD II 16/--/ACx (ACx)
combination of arch profiles, section B-B

Annex A 2.6.1.2



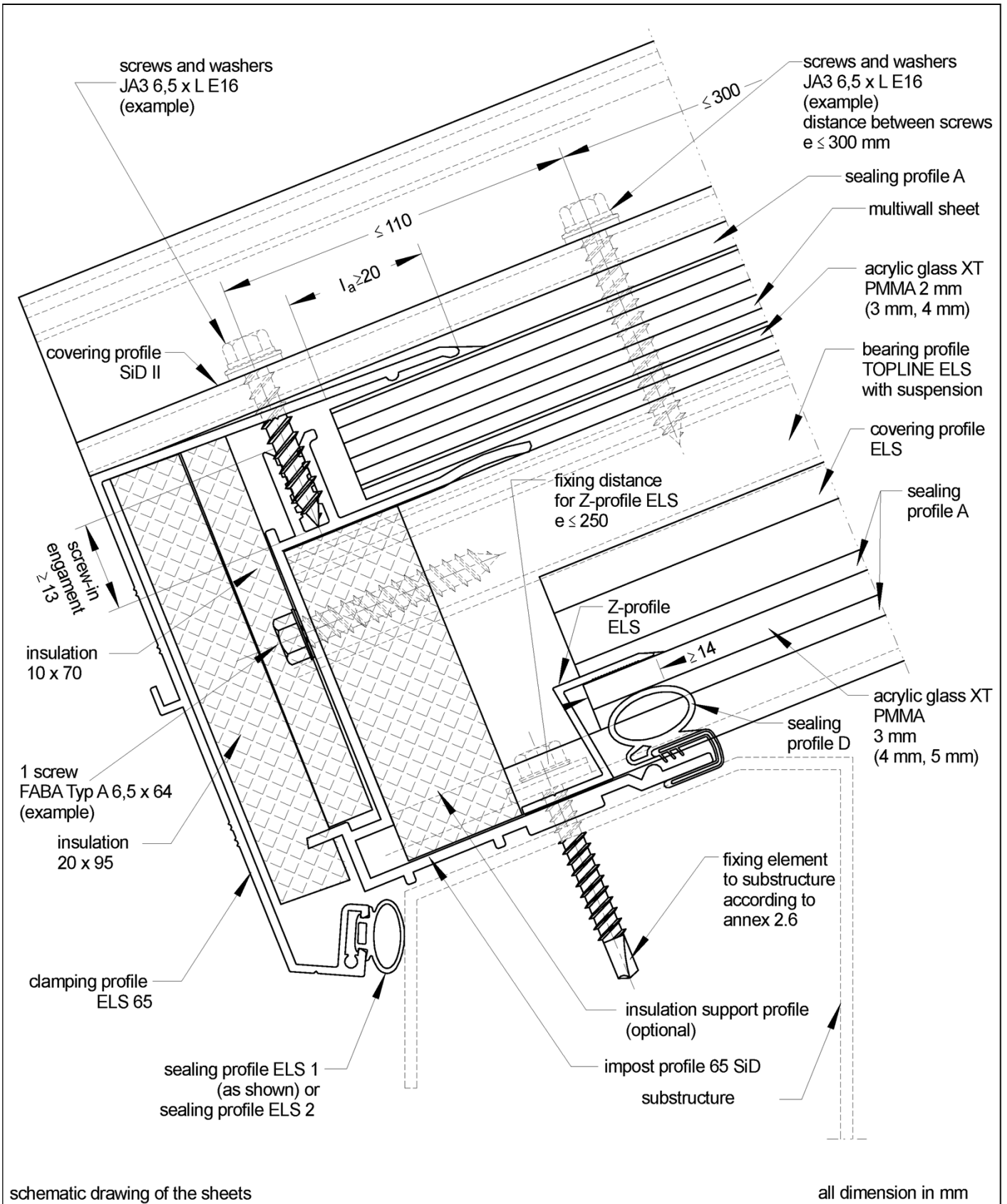
schematic drawing of the sheets

all dimensions in mm

Proline-E
Topline ELS-E

TOPLINE ELS SiD II 16/--/ACx (ACx)
combination of impost profiles, section D-D

Annex A 2.6.2

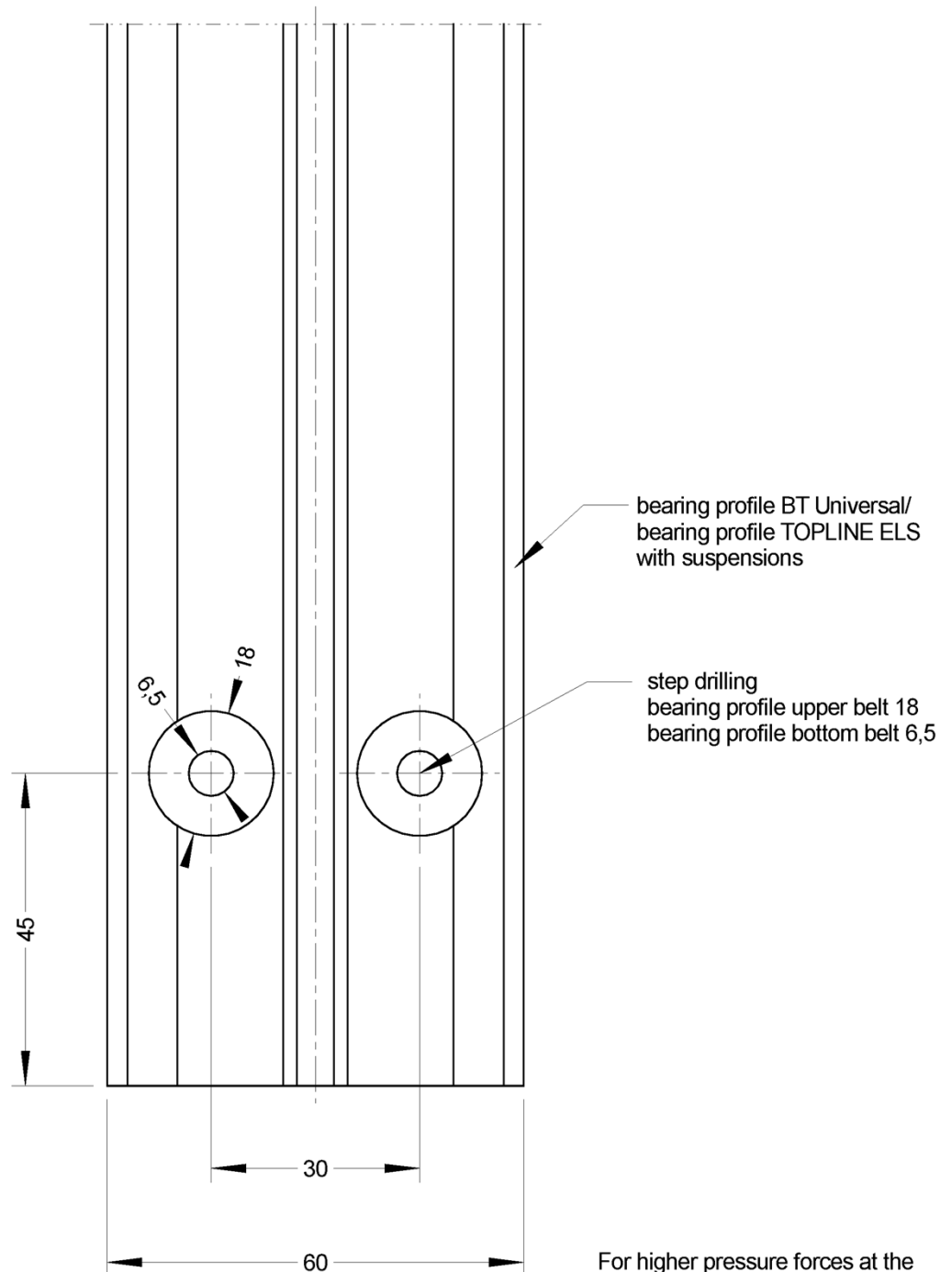


Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

TOPLINE ELS SiD II 16/--/ACx (ACx)
combination of impost profiles, section E-E

Annex A 2.6.3



2 screws with washers
REISSER R-K-6,3 x 38 - S14
or Zebra Piasta 6,3 x 38
(example)

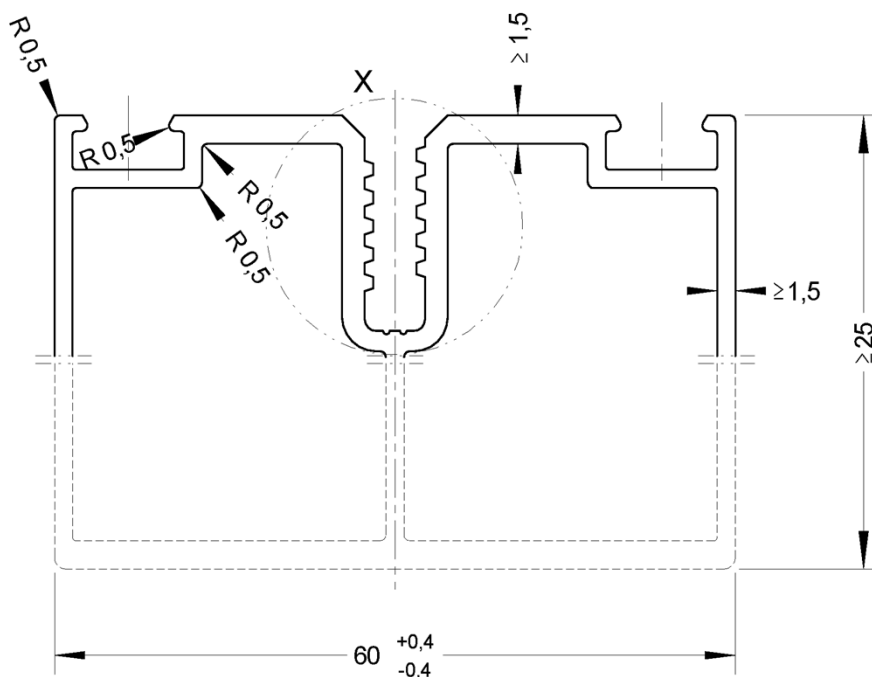
For higher pressure forces at the
support profile BT Universal /
support profile TOPLINE ELS
with a height of 65 mm
2 screws with washers can be used
REISSER R-K-6.3x38 - S14
additionally next to the support profile
(see Annex B.2.1)

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Proline-E
Topline ELS-E

"TOPLINE ELS ..." - and "PROLINE PC16 ..." -
top view bearing profile, fixing to impost profile

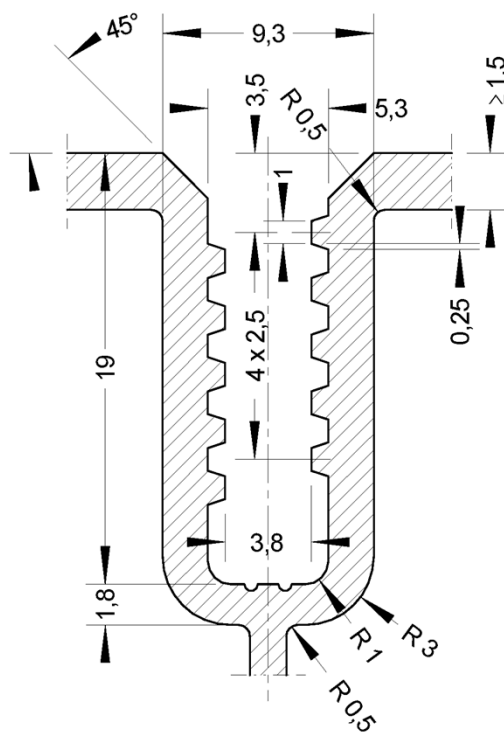
Annex A 2.7



radii without dimensions = R 0,3

EN AW-6060,
condition T66
according to DIN EN 755-2

detail X



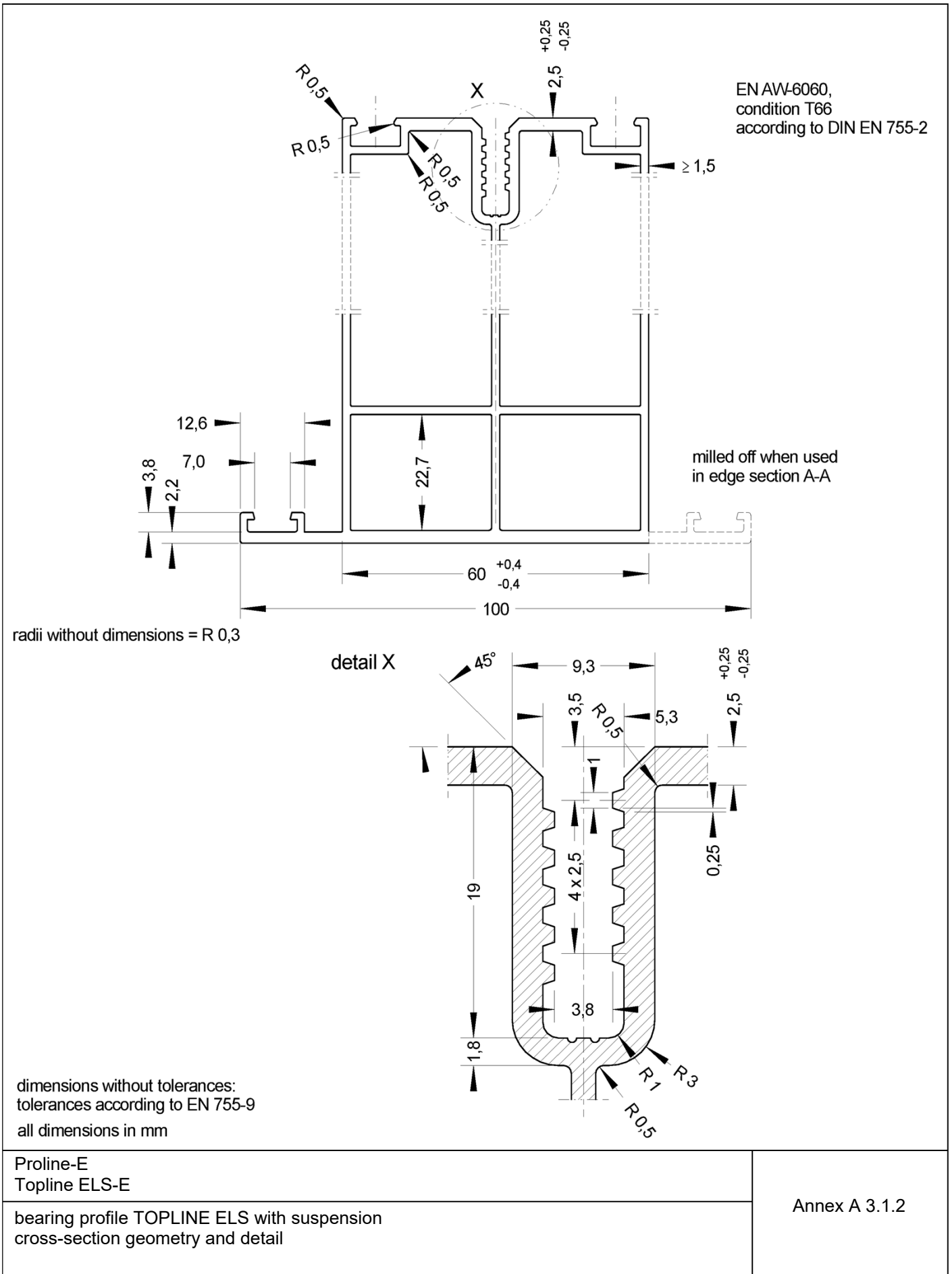
dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

Bearing profile BT Universal
cross-section geometry and detail

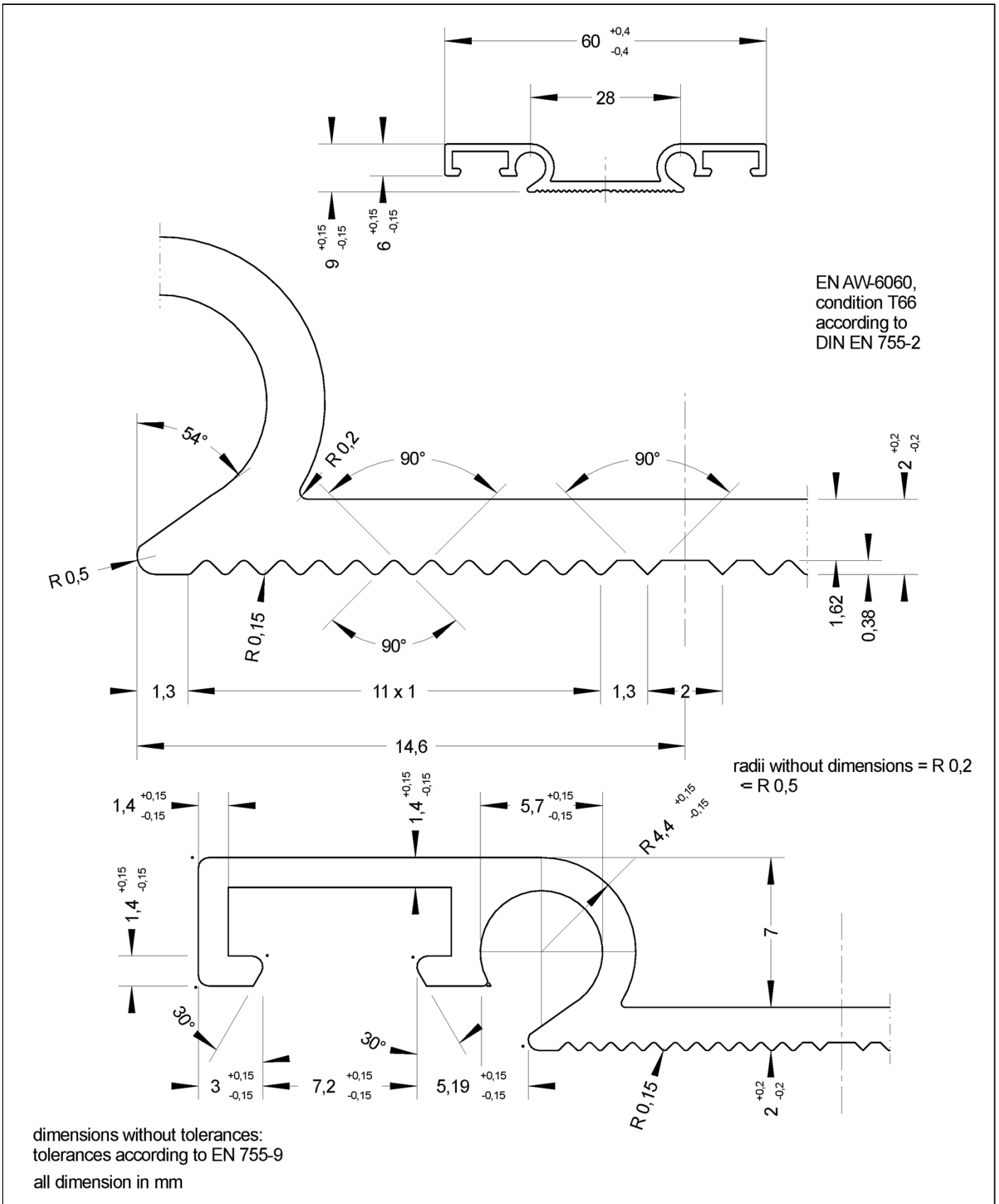
Annex A 3.1.1

English translation prepared by DIBt



Electronic copy by DIBt: ETA-21/0451

English translation prepared by DIBt



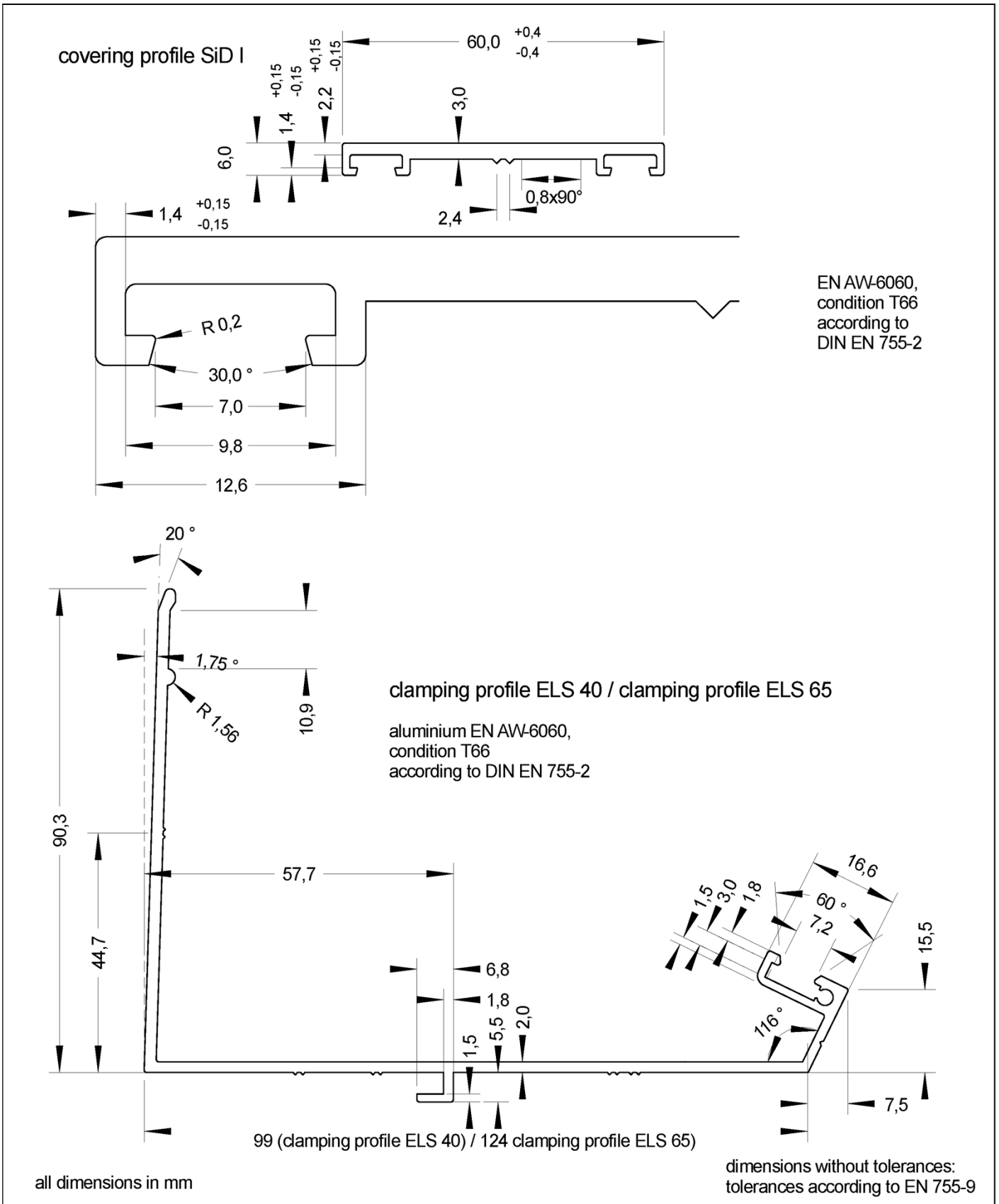
Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

covering profile SpF
cross-section geometry

Annex A 3.2.1

English translation prepared by DIBt

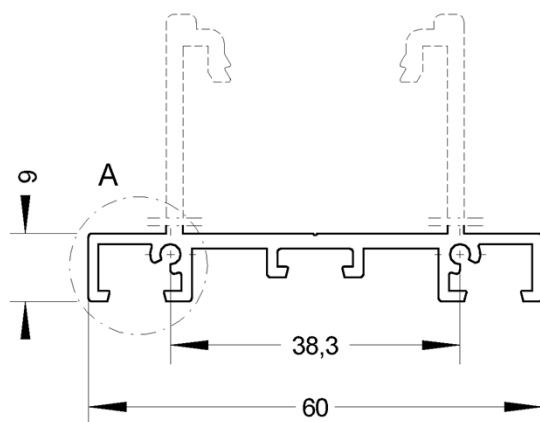


Electronic copy by DIBt: ETA-21/0451

Proline-E
Topline ELS-E

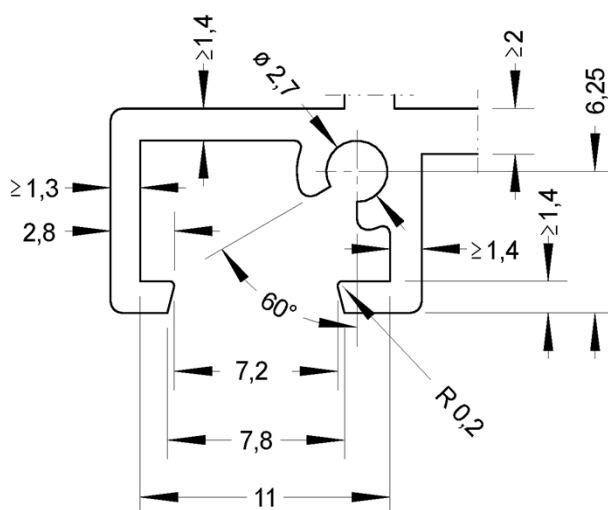
covering profile SiD I and clamping profile ELS
cross-section geometry

Annex A 3.2.2



EN AW-6060,
condition T66

detail A



dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

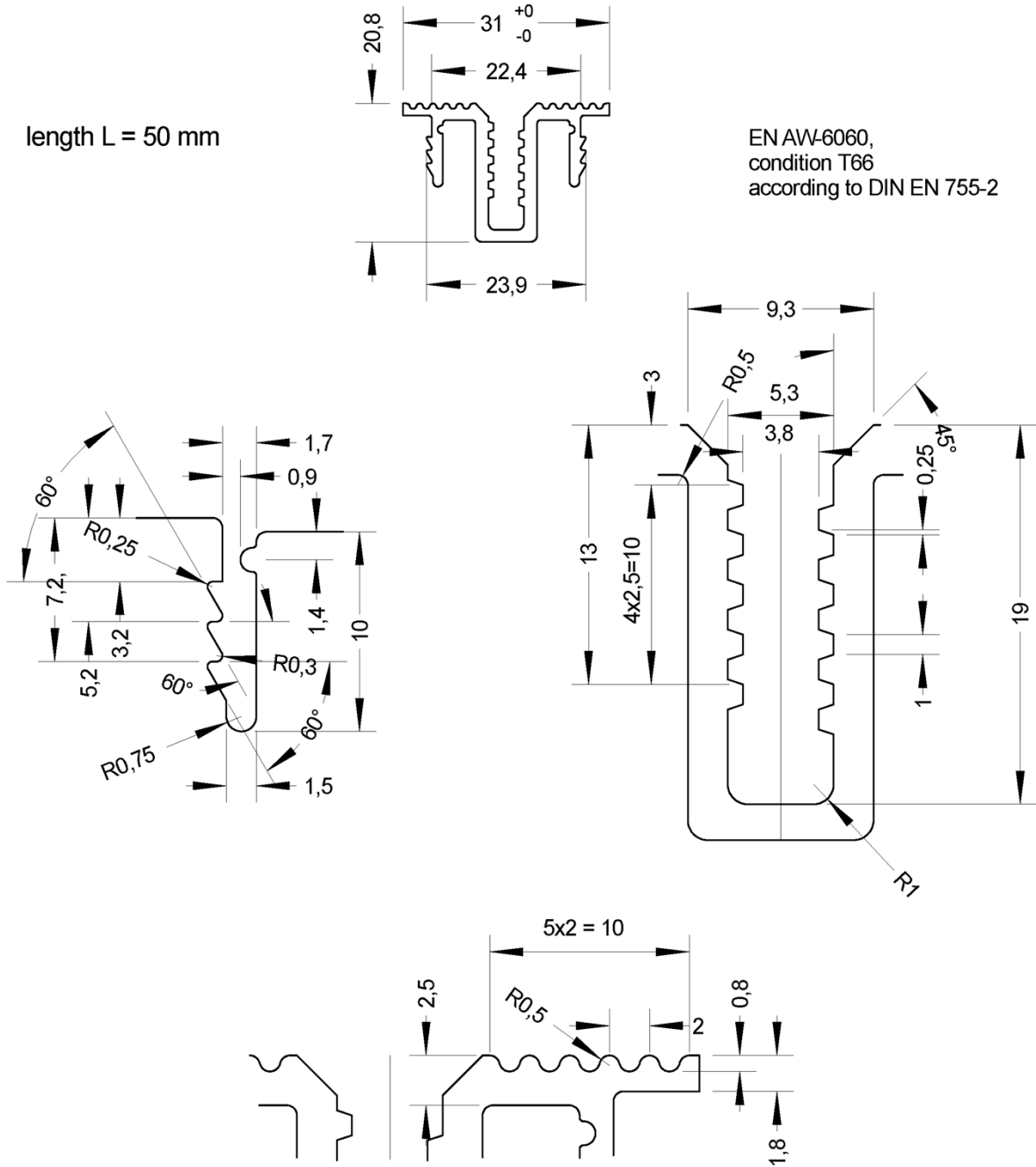
Proline-E
Topline ELS-E

covering profile SiD II
cross-section geometry

Annex A 3.2.3

length L = 50 mm

EN AW-6060,
condition T66
according to DIN EN 755-2



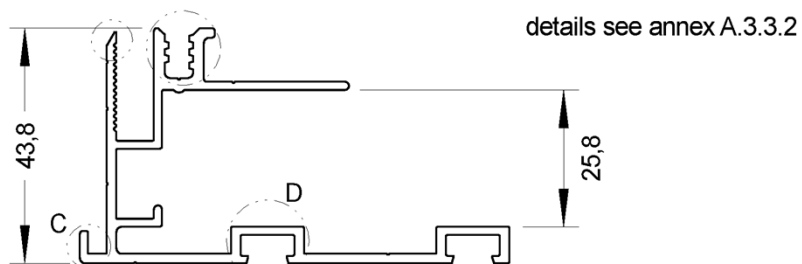
dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

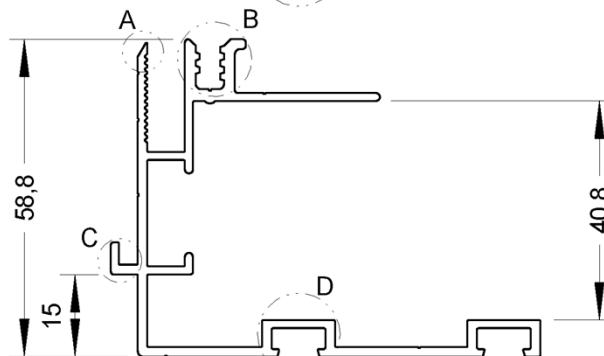
view WG-clip
cross-section geometry

Annex A 3.2.4

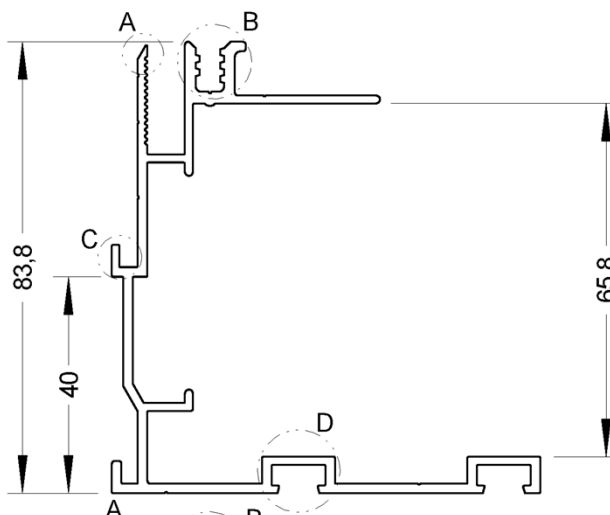
impost profile 25 SPF



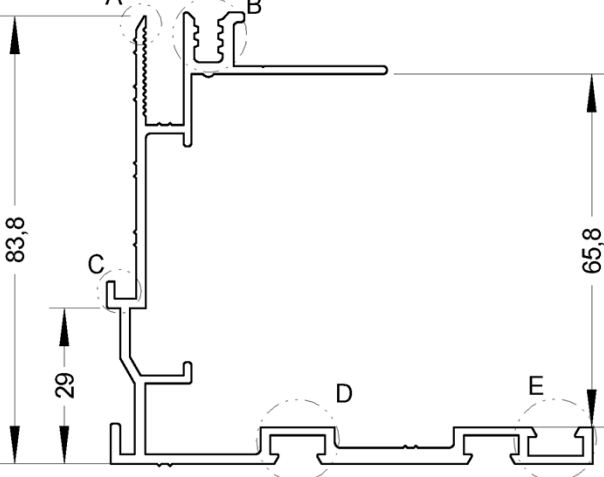
impost profile 40 SPF



impost profile 65-1 SPF (Pro)



impost profile 65-2 SPF (ELS)



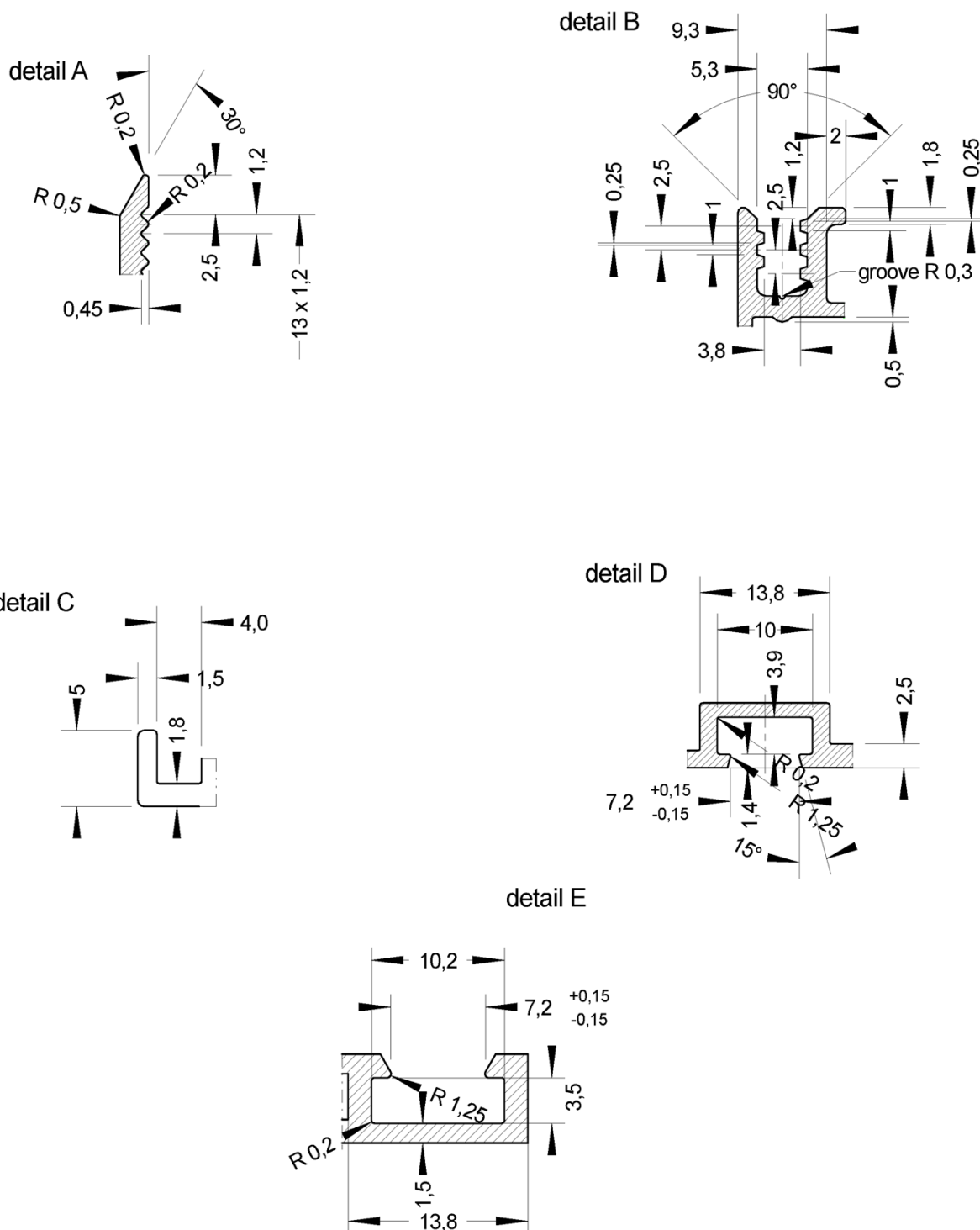
aluminium EN AW-6060,
condition T66
according to DIN EN 755-2

dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

impost profile 25 SpF, - 40 SpF, - 65 SPF (Pro) and - 65-2 SpF (ELS)
cross-section geometry

Annex A 3.3.1



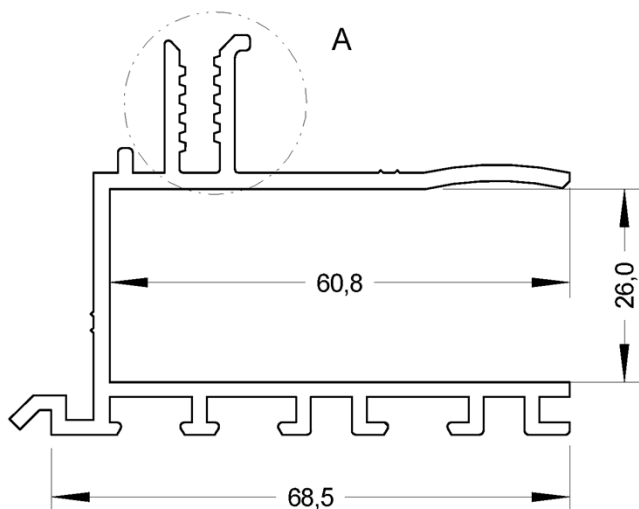
dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

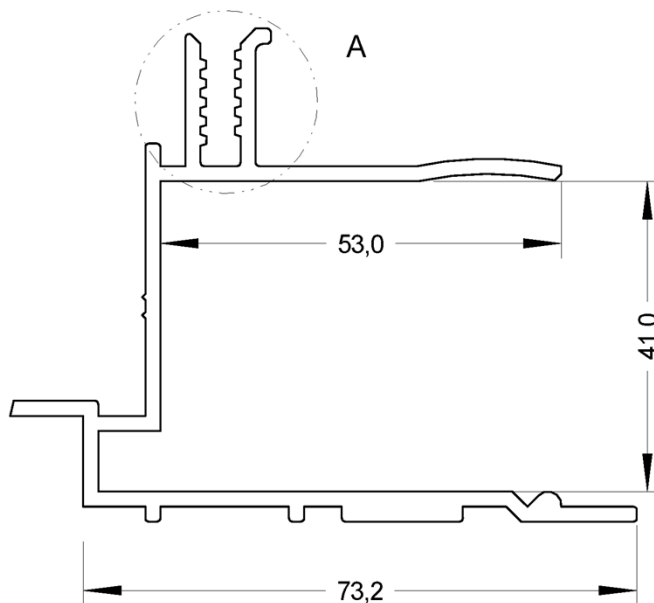
impost profiles, details A to E
cross-section geometry

Annex A 3.3.2

impost profile 25 SiD

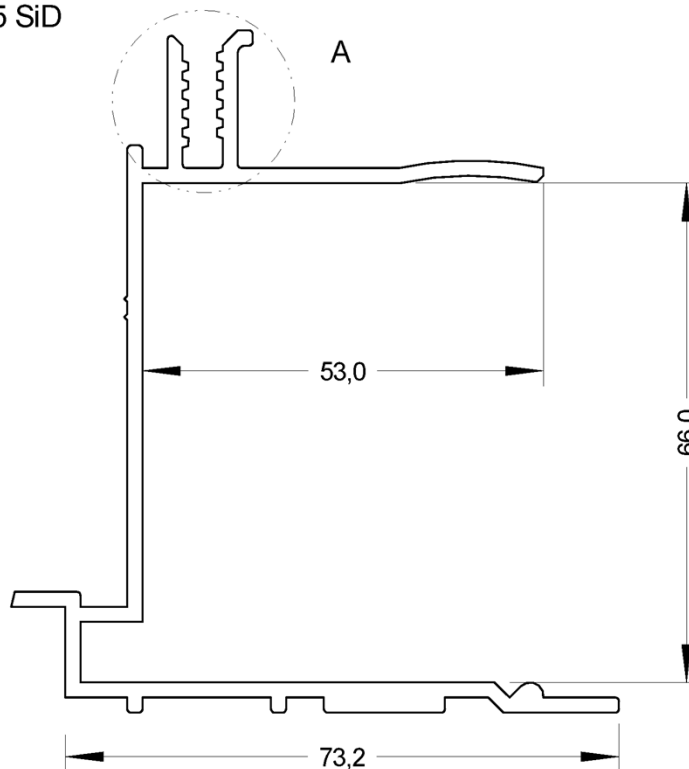


impost profile 40 SiD



detail A see Annex A.3.4.2

impost profile 65 SiD



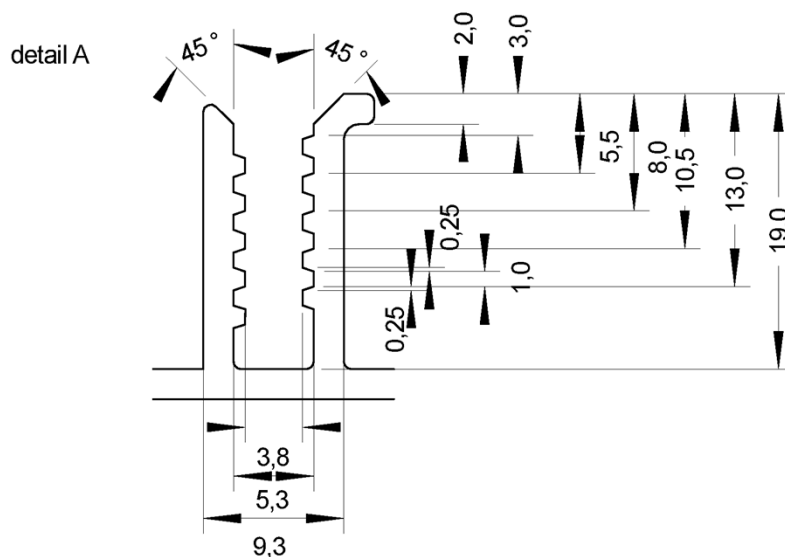
aluminium EN AW-6060,
condition T66
according to DIN EN 755-2

dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

impost profile 25 SiD, - 40 SiD and - 65 SiD
cross-section geometry

Annex A 3.4.1



aluminium EN AW-6060,
condition T66
according to DIN EN 755-2

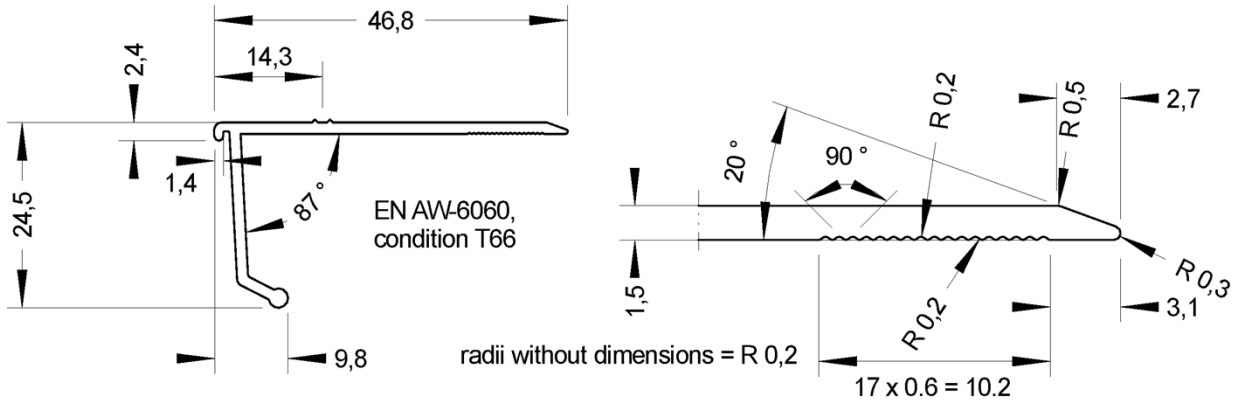
dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

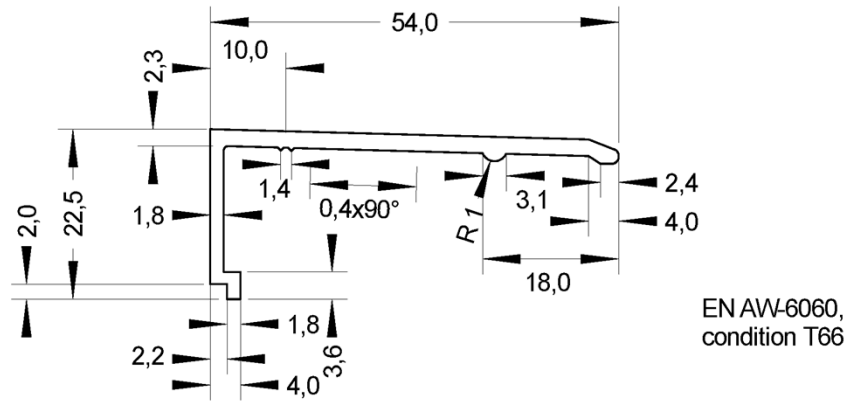
impost profile SiD, detail A
cross-section geometry

Annex A 3.4.2

clamping profile Pro 16 SpF



clamping profile Pro 16 SiD

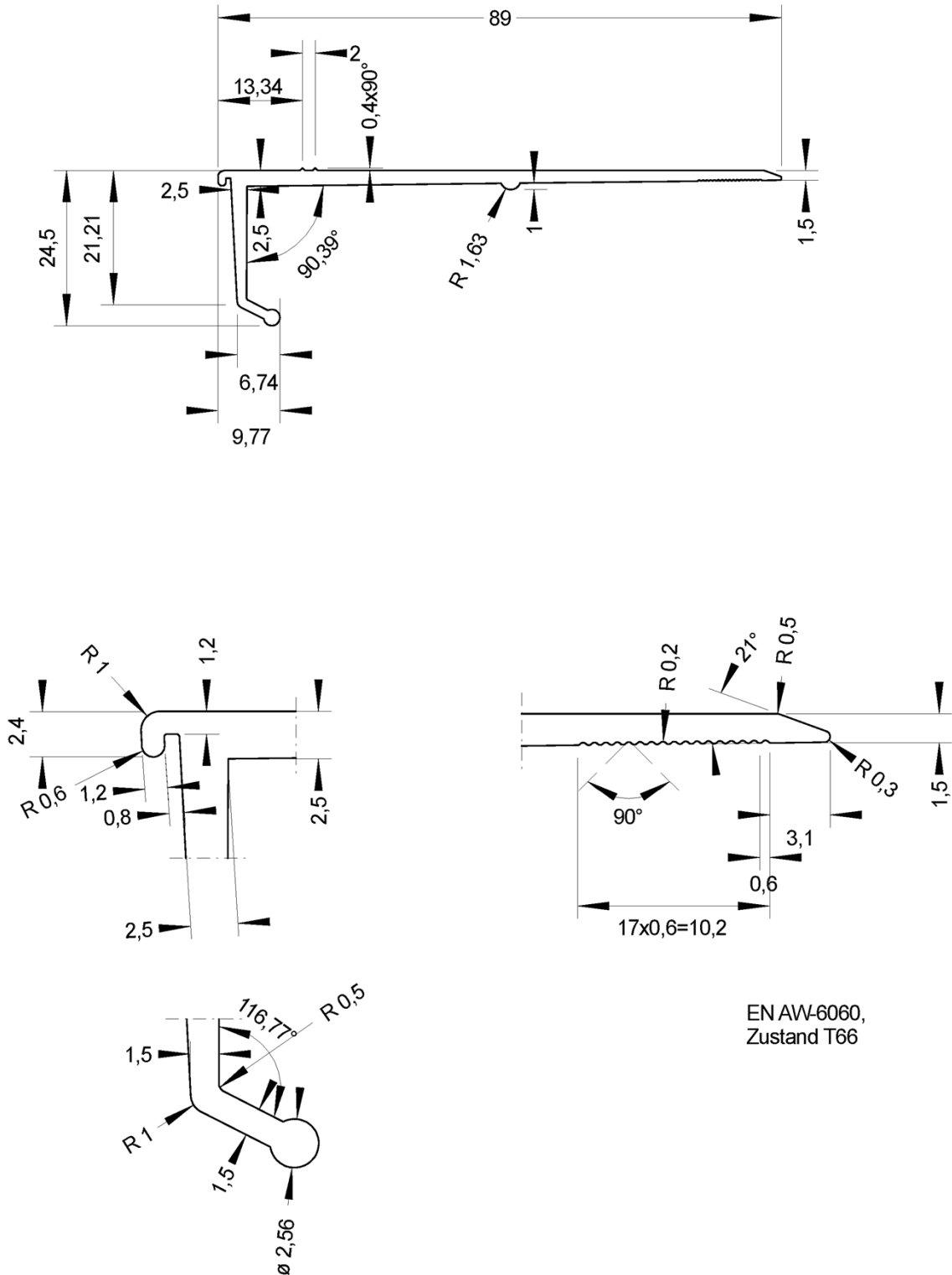


dimensions without tolerances:
 tolerances according to EN 755-9
 all dimensions in mm

Proline-E
 Topline ELS-E

clamping profile Pro 16 SpF and - Pro 16 SiD
 cross-section geometry

Annex A 3.5.1



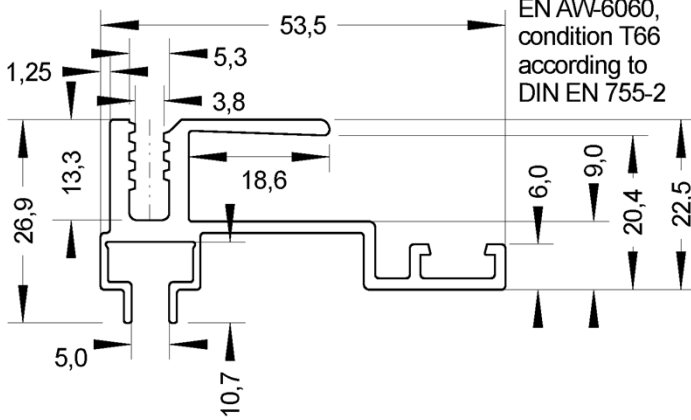
dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

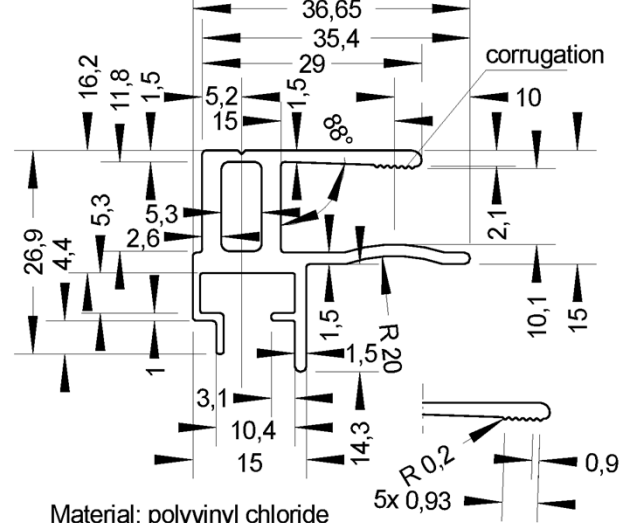
clamping profile Pro 16-L SpF
cross-section geometry

Annex A 3.5.2

clip profile ELS (AL)

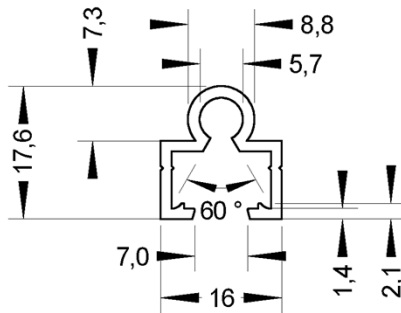


clip profile ELS (PVC)



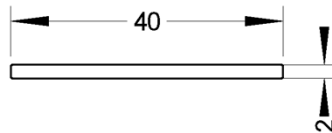
covering profile ELS

aluminium EN AW-6060,
condition T66
according to DIN EN 755-2



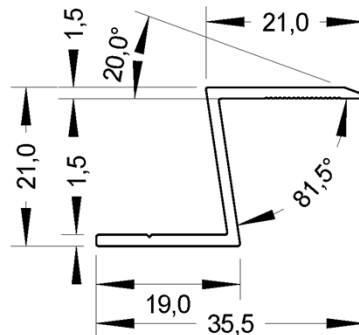
tensioning band ELS

aluminium EN AW-6060,
condition T66
according to DIN EN 755-2



Z-profile ELS

aluminium EN AW-6060,
condition T66
according to DIN EN 755-2



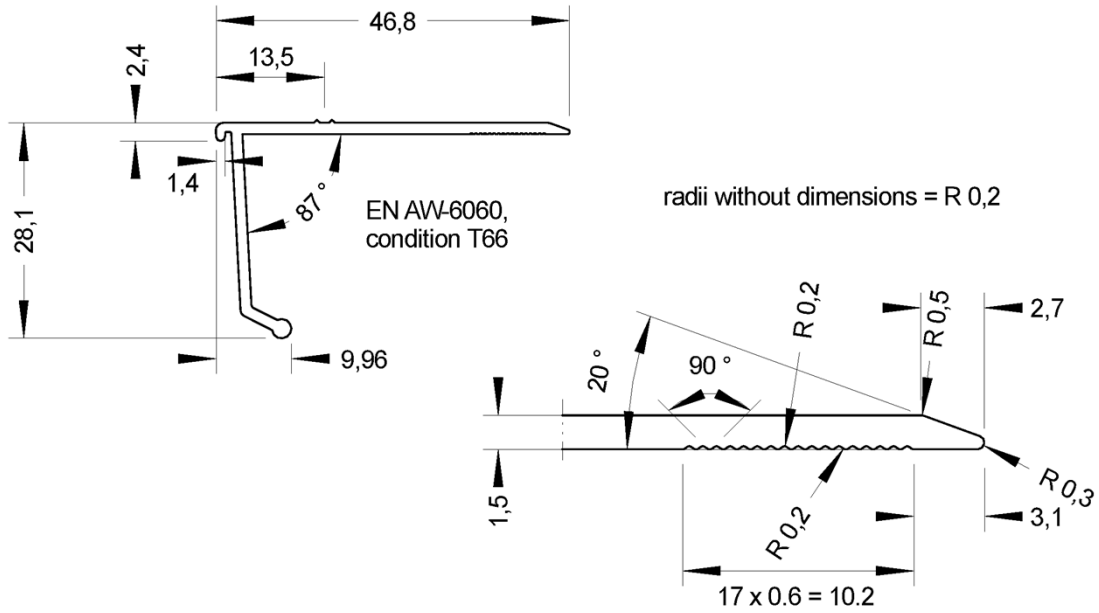
dimensions without tolerances:
tolerances according to EN 755-9
all dimension in mm

Proline-E
Topline ELS-E

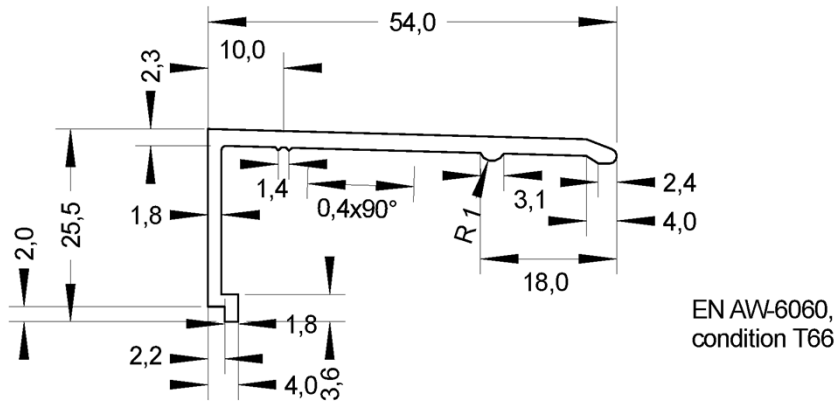
Z-profile ELS, tensioning band ELS, covering profile ELS and clip profile ELS
cross-section geometry

Annex A 3.5.3

clamping profile Pro 20 SpF



clamping profile Pro 20 SiD

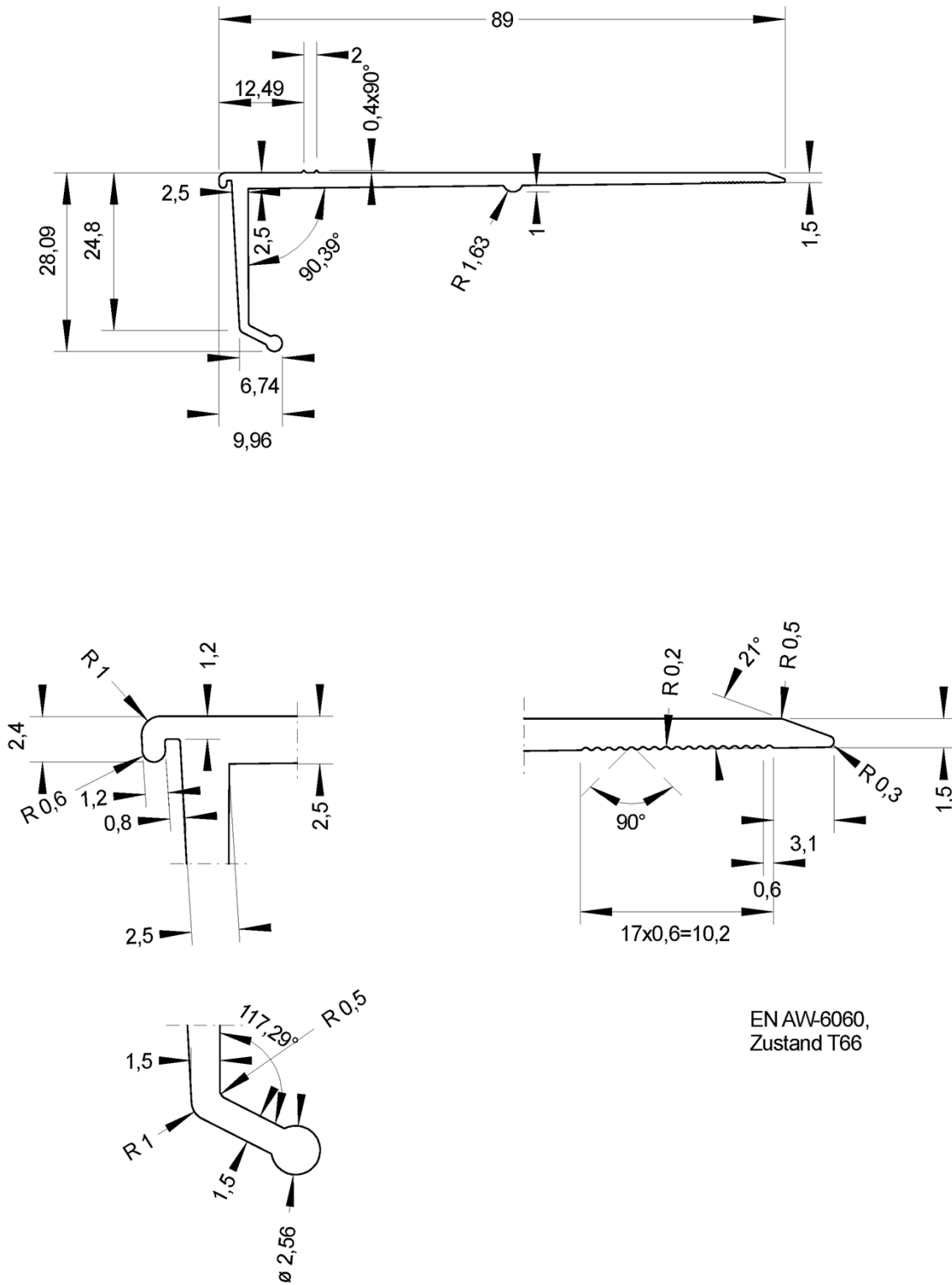


dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

clamping profile Pro 20 SpF and - Pro 20 SiD
cross-section geometry

Annex A 3.5.4



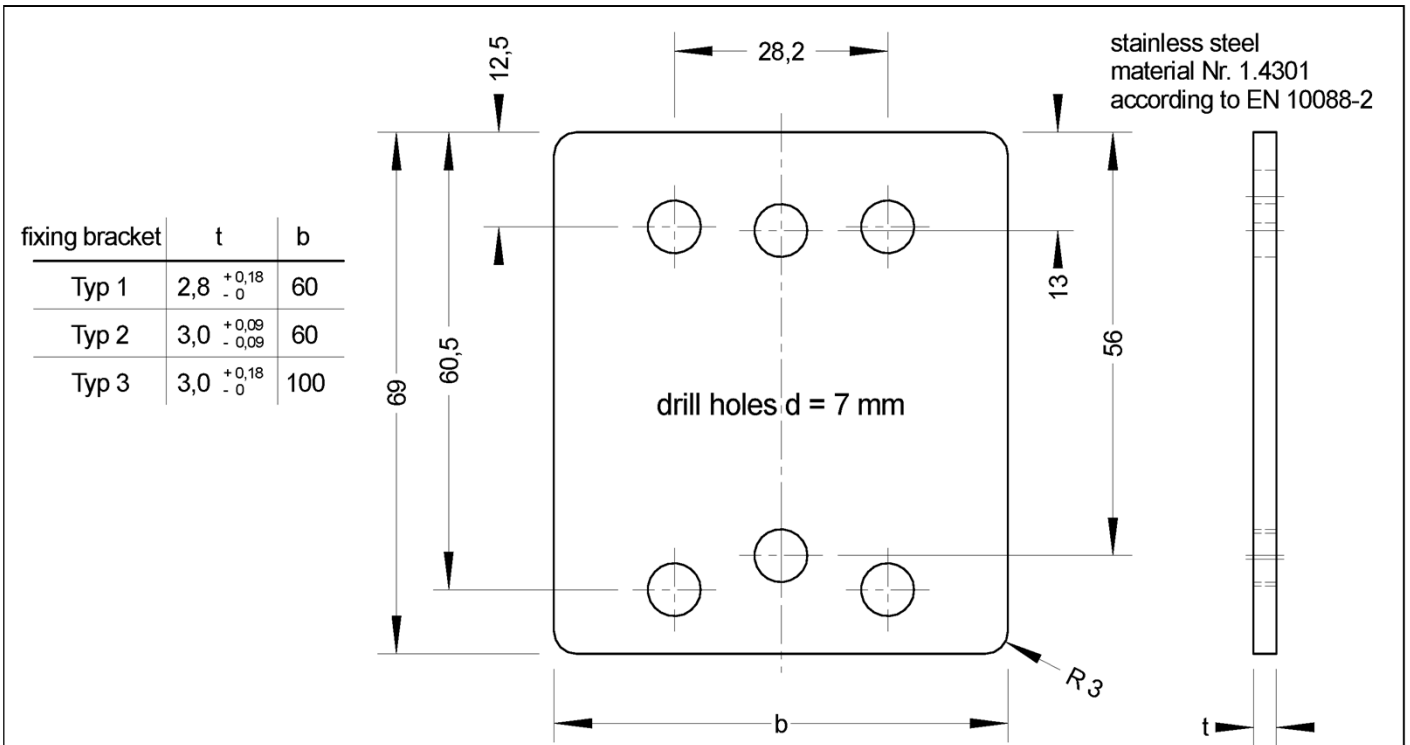
dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

Proline-E
Topline ELS-E

clamping profile Pro 20-L SpF
cross-section geometry

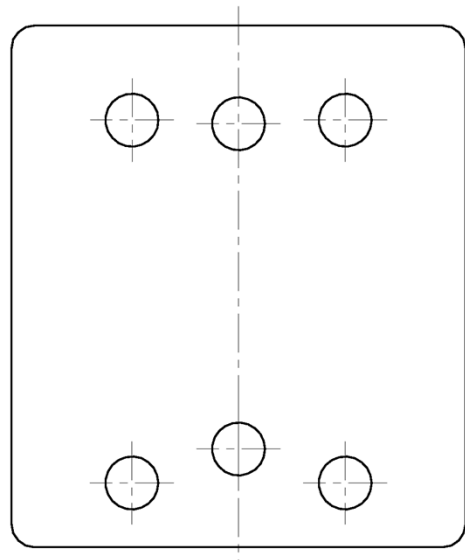
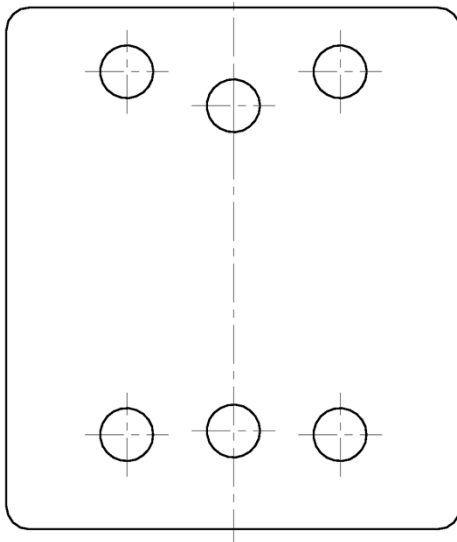
Annex A 3.5.5

English translation prepared by DIBt



installation position for systems
full-surface addition to the
main cover PC16 with AC3 or AC4
or at main cover PC20

installation position for all other systems



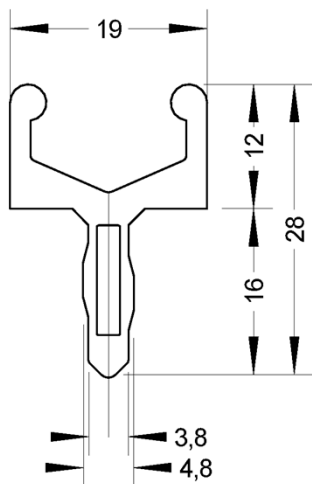
main cover PC20 may only be supplemented with a maximum of 2,5 mm
(GFK 1,2 / GFK 1,3 / Alu 1,0 or frame subcarrier 1,1 mm).

main cover PC20 may not be supplemented by AC 3 mm and not by AC 4 mm.

all dimensions in mm

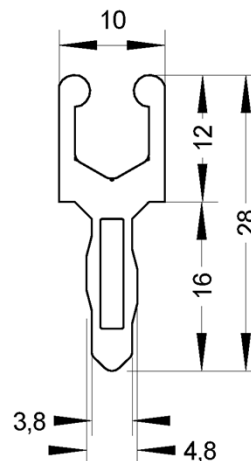
Proline-E Topline ELS-E	Annex A 3.6
fixing bracket SpF	

spacer 19
length 35 mm

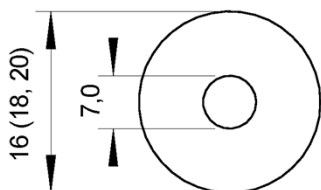


material:
polypropylene (PP) according to EN ISO 19069-1

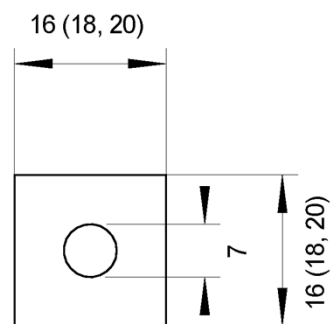
spacer 10
length 35 mm



spacer 16,
spacer 18
or
spacer 20



thickness 3 mm



material: polyvinyl chloride
ISO 21306-1 - PVC-U., EGL, 078 - 05 - T28

alternative:
stainless steel
material Nr. 1.4301
according to EN 10088-2
or aluminium

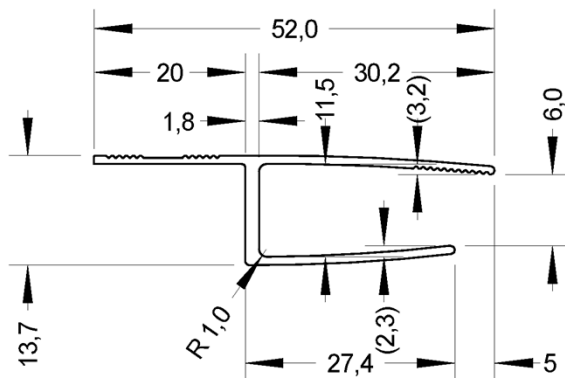
all dimensions in mm

Proline-E
Topline ELS-E

spacer 10 and 19 and spacer 16, 18 and 20

Annex A 3.7

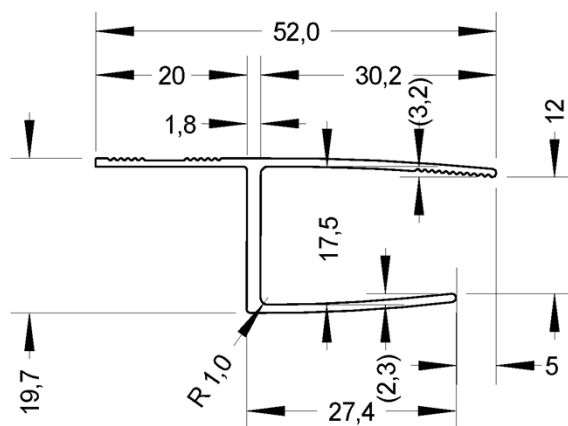
frame subcarrier PC10



material:
polycarbonate (PC)
ISO 21305-PC,X,EGL,03-09

tolerances
according to
DIN 16941

frame subcarrier PC16



material:
polycarbonate (PC)
ISO 21305-PC,X,EGL,03-09

tolerances
according to
DIN 16941

all dimensions in mm

wall thicknesses without dimensions = 1,1

Proline-E
Topline ELS-E

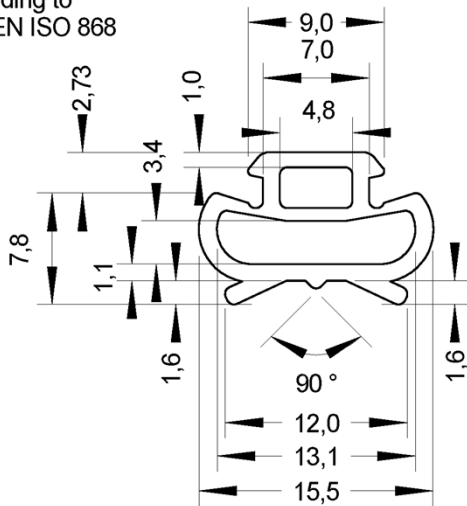
frame subcarrier PC 10 and PC 16

Annex A 3.8

English translation prepared by DIBt

sealing profile A

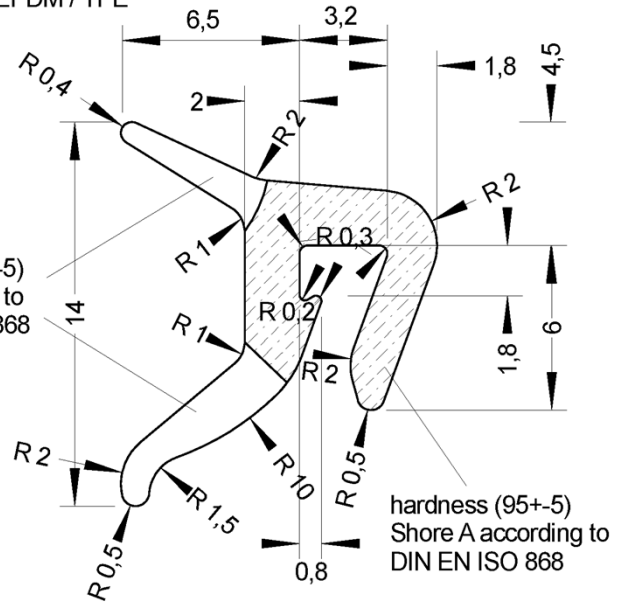
EPDM according to DIN 7863
hardness (60±5) Shore A
according to DIN EN ISO 868



sealing profile B

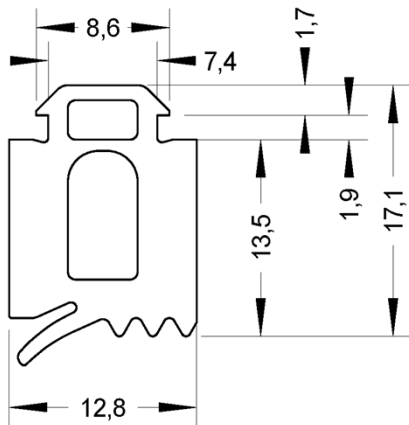
version EPDM / TPE

hardness (70±5)
Shore A according to
DIN EN ISO 868



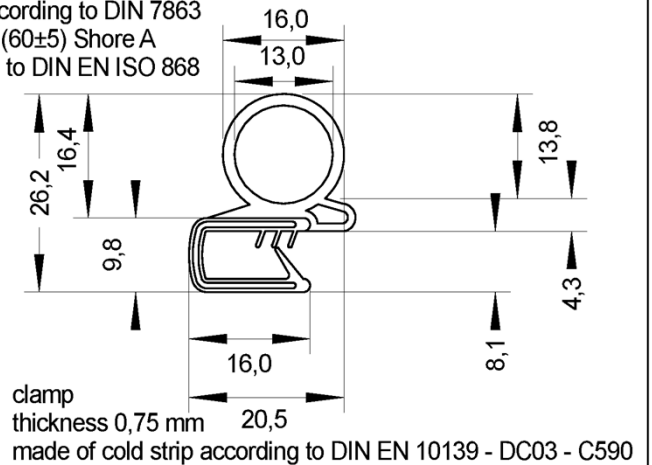
sealing profile C

EPDM according to DIN 7863
hardness (60±5) Shore A
according to DIN EN ISO 868



sealing profile D

EPDM according to DIN 7863
hardness (60±5) Shore A
according to DIN EN ISO 868



all dimensions in mm

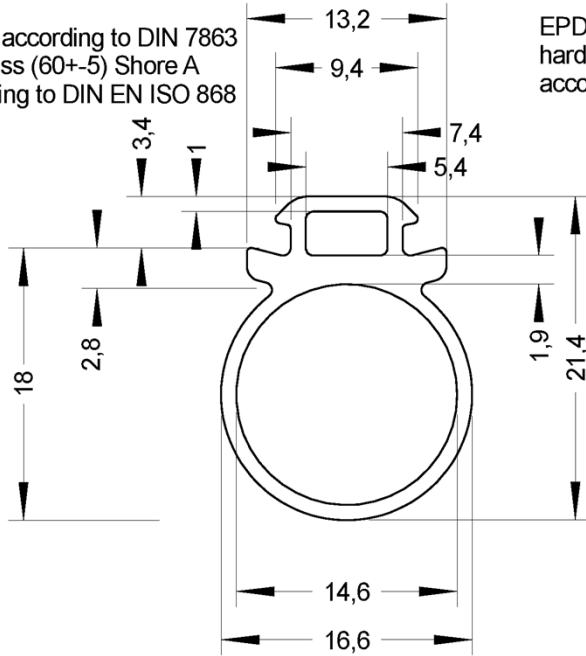
Proline-E
Topline ELS-E

sealing profiles A to D
cross-section geometry

Annex A 3.9.1

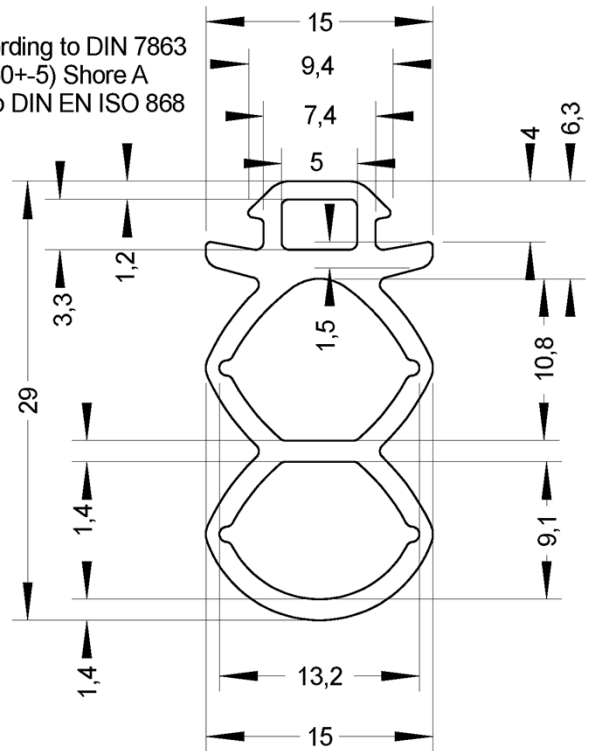
sealing profile ELS 1

EPDM according to DIN 7863
hardness (60±5) Shore A
according to DIN EN ISO 868



sealing profile ELS 2

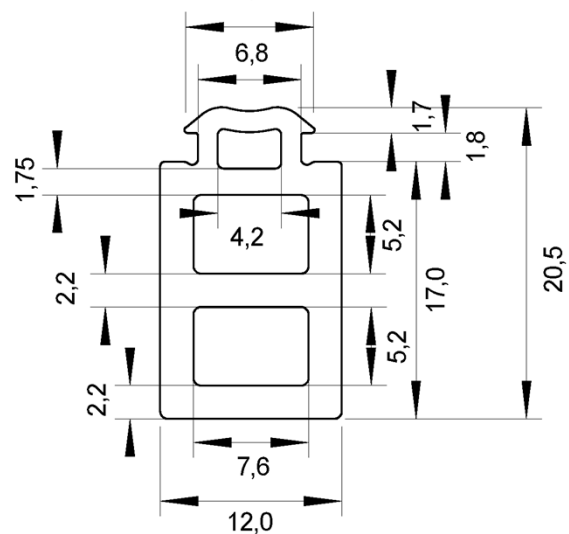
EPDM according to DIN 7863
hardness (60±5) Shore A
according to DIN EN ISO 868



sealing profile F

(used for systems with main covering of 20 mm,
alternative for sealing profile C)

EPDM according to DIN 7863
hardness (60±5) Shore A
according to DIN EN ISO 868 8,6



all dimension in mm

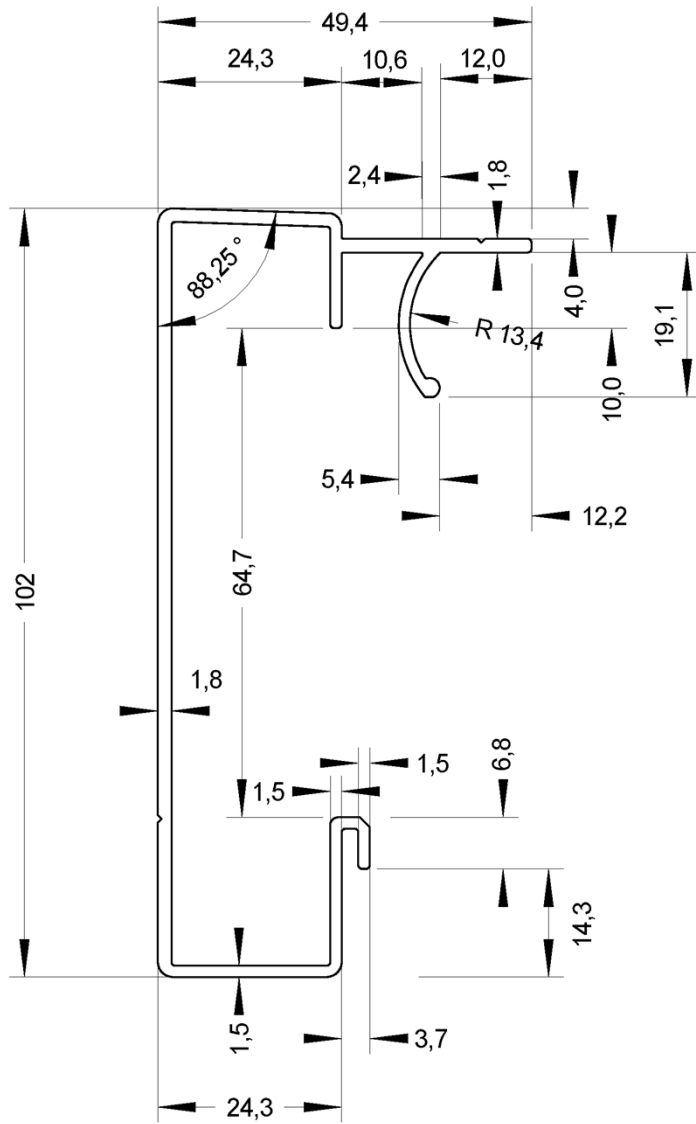
Proline-E
Topline ELS-E

sealing profile F, ELS 1 and ELS 2 and distance profile ELS
cross-section geometry

Annex A 3.9.2

adapter ELS 65 SpF

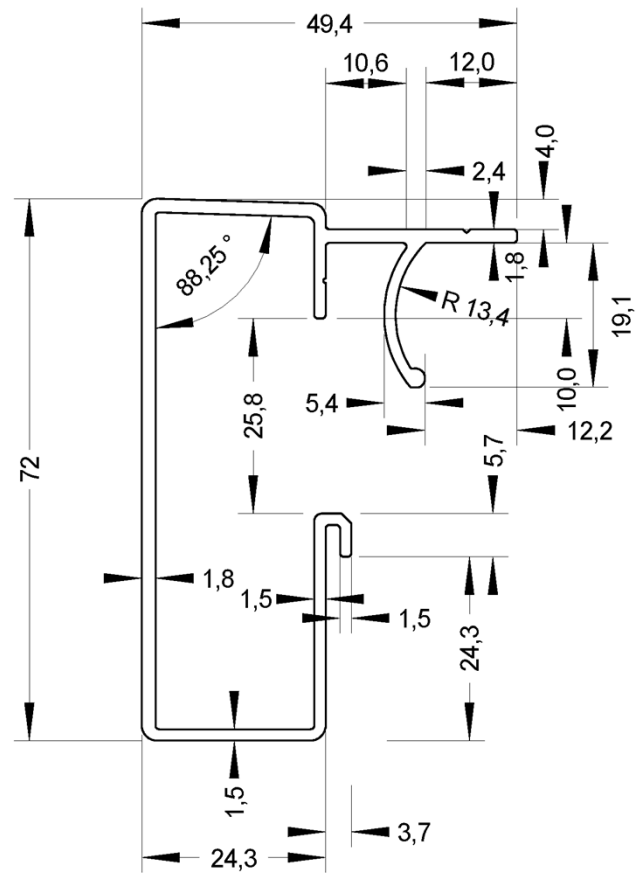
aluminium EN AW-6060
condition T66
according to DIN EN 755-2



component length 90 mm

adapter ELS 40 SpF

aluminium EN AW-6060
condition T66
according to DIN EN 755-2



component length 90 mm

dimensions without tolerances:
tolerances according to EN 755-9
all dimensions in mm

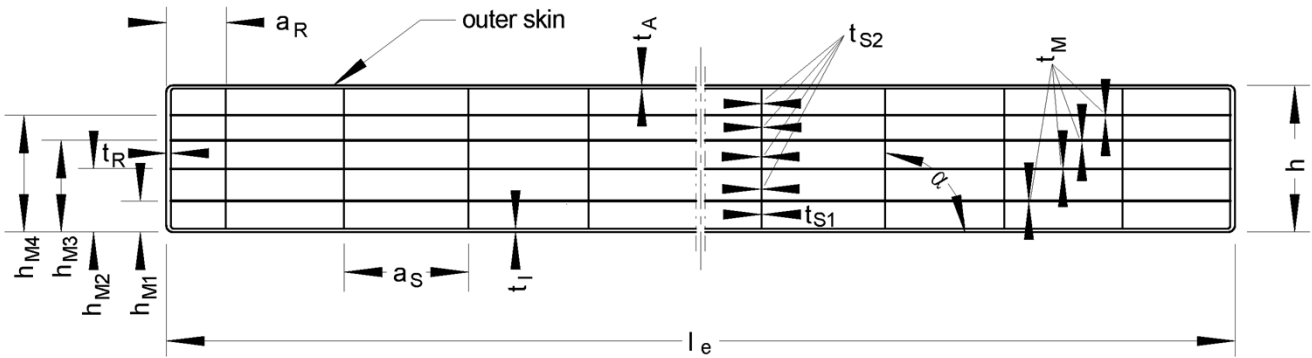
Proline-E
Topline ELS-E

adapter profiles ELS 65 SpF and ELS 40 SpF
cross-section geometry

Annex A 3.10

English translation prepared by DIBt

Sheet: Exolon multi UV 6/16-20
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	a_s mm	a_R mm	t_A mm	t_I mm
2100	16,5	3,3	6,2	9,3	12,6	19,5	16,8	0,86	0,78
+6 -2	$\pm 0,5$	+ 0,25 - 0,15	+ 0,25 - 0,3	+ 0,35 - 0,25	$\pm 0,25$	+ 0,45	+ 1,15	- 0,05	- 0,08

t_{S1} mm	t_{S2} mm	t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,47	0,33	0,05	0,46	2,73	
- 0,05	- 0,08	- 0,01	- 0,09	+ 0,16 - 0,06	$\leq 4^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
201 Nm ² /m	28,0 Nm ² /m	1868 N/m	65,6 Nm/m	60,6 Nm/m

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

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

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

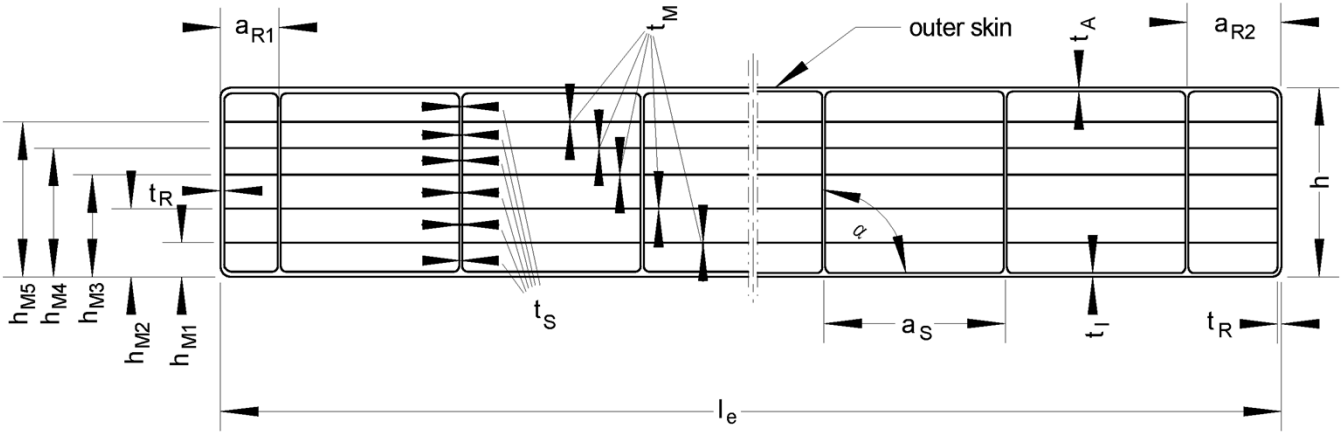
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements Minimum performance levels or classes in accordance with EN 16153 of the "Exolon multi UV 6/16-20"

Annex A 4.1

English translation prepared by DIBt

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



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

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

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 ² /m	45,7 Nm ² /m	2254 N/m	64,6 Nm/m	62,9 Nm/m

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

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

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

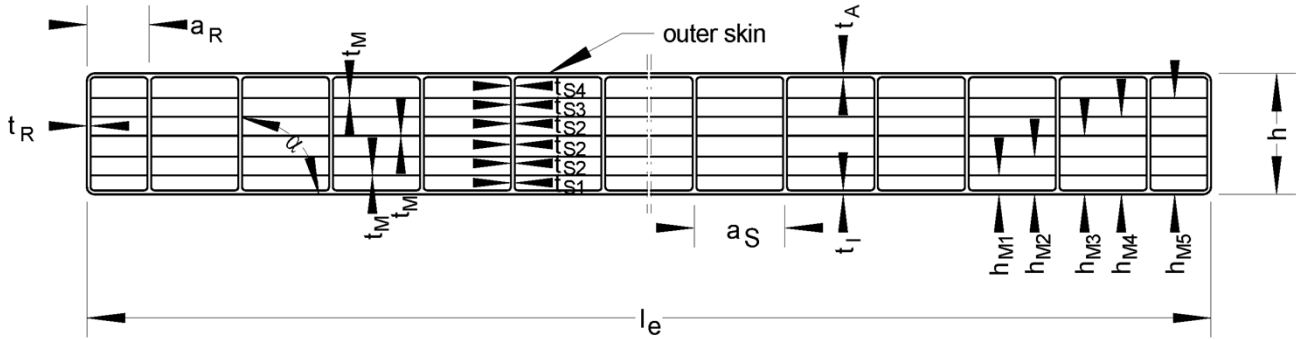
Proline-E
Topline ELS-E

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 4.2

English translation prepared by DIBt

Sheet: Akyver Sun Type 16/7w-12 2600
Manufacturer: CORPLEX, Kayserberg
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 ²	difference $ \Delta\alpha $ to 90°
0,41	0,39	0,44	0,44	0,06	0,58	2,56	
- 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 ² /m	58,8 Nm ² /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 strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

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

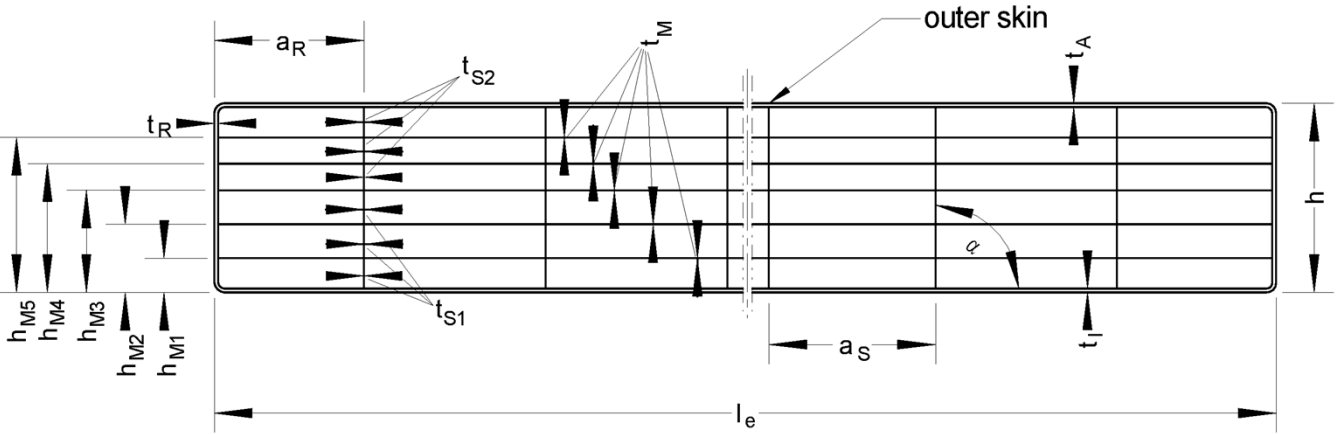
Proline-E
Topline ELS-E

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: **Macrolux Multiwall LL 7W - 16 mm 2600**
 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_l 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 ²	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 ² /m	36,0 Nm ² /m	2404 N/m	70,8 Nm/m	63,1 Nm/m

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

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

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

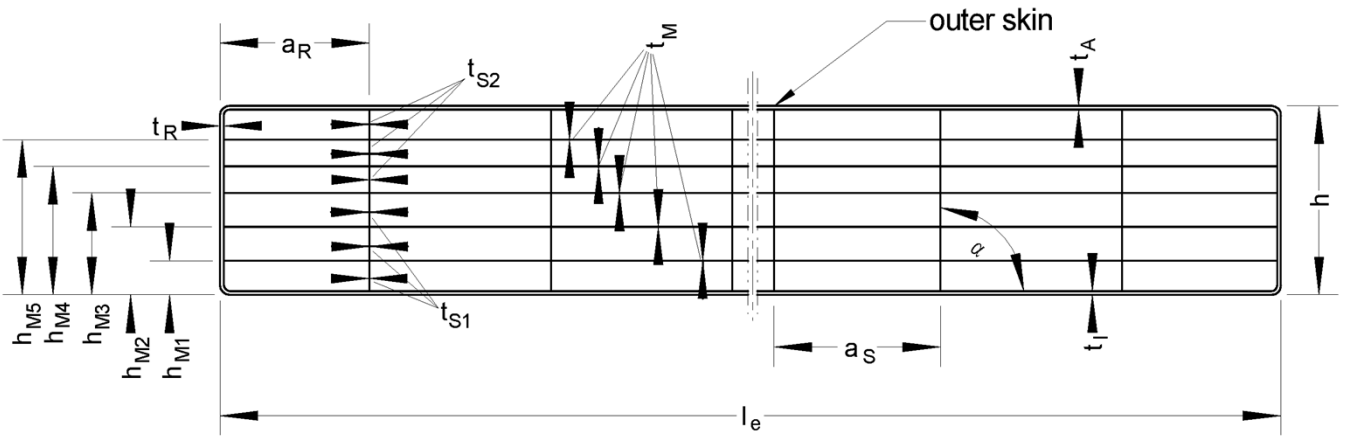
Proline-E
Toplevel ELS-E

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 - 2600"

Annex A 4.4

English translation prepared by DIBt

Sheet: **Macrolux Multiwall LL 7W - 16 mm 2700**
 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	16,2	2,8	5,0	7,4	10,3	13,0	15,8	13,7	0,56	0,60
+6 -2	$\pm 0,5$	+ 0,35 - 0,2	+ 0,4 - 0,3	+ 0,4 - 0,25	+ 0,3 - 0,4	+ 0,35 - 0,25	+ 0,55	+ 2,30	- 0,05	- 0,08

t_{s1} mm	t_{s2} mm	t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,59	0,43	0,08	0,56	2,70	
- 0,18	- 0,10	- 0,03	- 0,07	+ 0,16 - 0,08	$\leq 5^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
158,6 Nm ² /m	74,8 Nm ² /m	2761 N/m	60,7 Nm/m	63,1 Nm/m

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

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

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

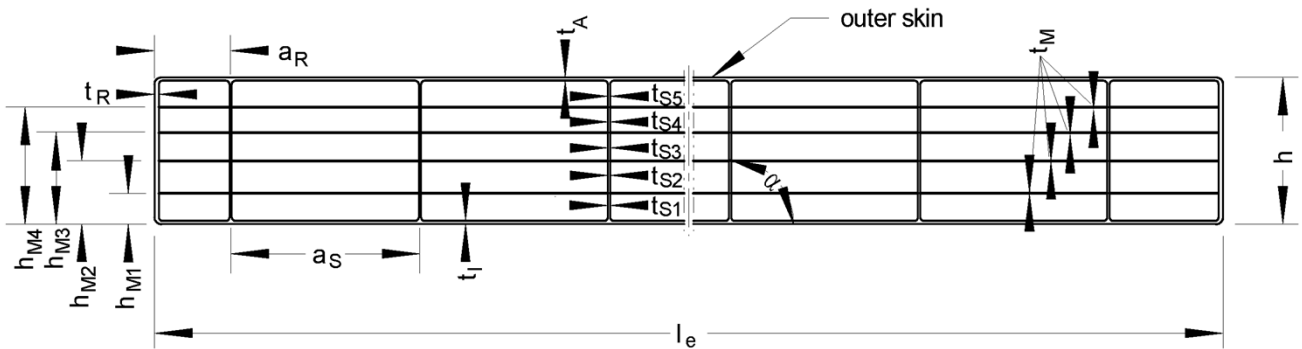
Proline-E
Topline ELS-E

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 - 2700"

Annex A 4.5

English translation prepared by DIBt

Sheet: Polcarb 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 ²	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 ² /m	43,7 Nm ² /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 strength
10 (ΔA)	5 % (ΔA)	Cu 1	Ku 1

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

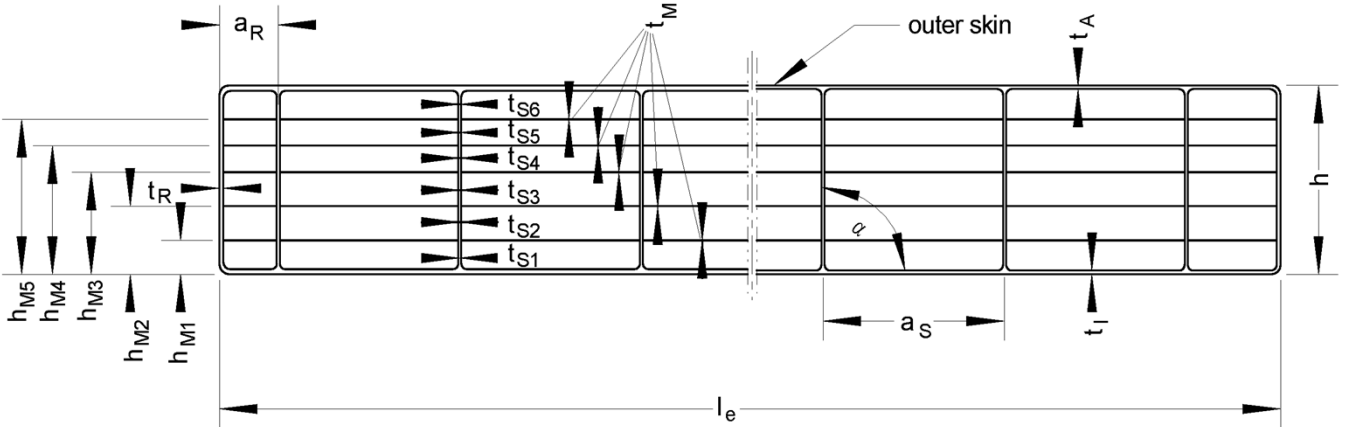
Proline-E
Topline ELS-E

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 4.6

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	weight per area kg/m ²
2100	15,9	2,7	5,5	8,0	10,7	13,4	13,8	10,8	2,64
+6	+ 0,6	+ 0,4	+ 0,6	+ 0,2	+ 0,3	+ 0,2	+ 0,2	+ 1,1	+ 0,09
-2	- 0,4	- 0,5	- 0,3	- 0,4	- 0,2	- 0,3			- 0,17

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

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 ² /m	48,4 Nm ² /m	2195 N/m	69,7 Nm/m	58,7 Nm/m

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

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

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

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

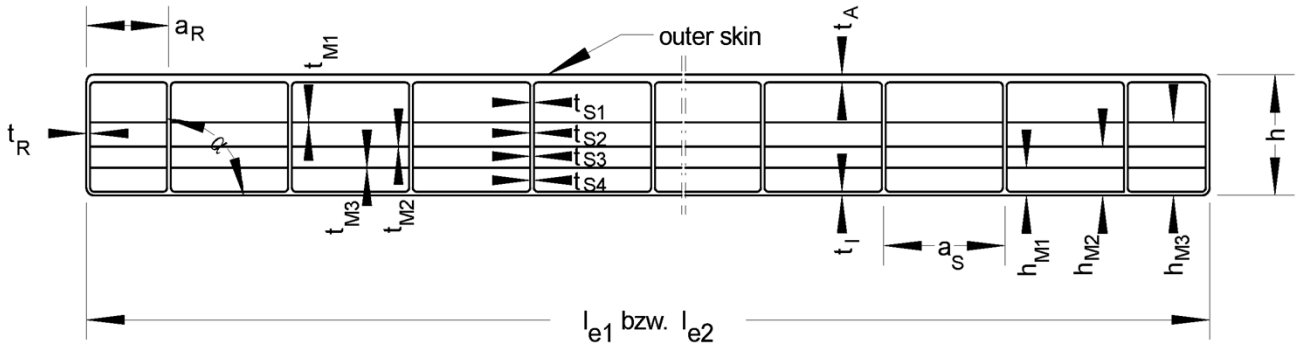
Proline-E
Topline ELS-E

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 4.7

English translation prepared by DIBt

Sheet: **Hohlkammerscheibe PC 16-5 High Impact**
 Manufacturer: **RODECA GmbH, Mühlheim**
 Resin: **ISO 21305-PC,X, EGL,03-09**



l_{e1} mm	l_{e2} mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	a_S mm	a_R mm	t_A mm	t_I mm
980	1200	15,9	3,7	6,5	9,7	15,8	12,2	1,59	0,68
+6 -2	+6 -2	±0,5	+0,4 -0,3	+0,35 -0,6	+0,4 -0,6	+0,50	+2,2	-0,27	-0,15

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_{M1} mm	t_{M2} mm	t_{M3} mm	t_R mm	weight per area kg/m ²	difference Δα to 90°
0,32	0,43	0,67	0,82	0,15	0,12	0,12	0,85	3,97	
-0,07	-0,16	-0,28	-0,28	-0,05	-0,08	-0,07	-0,22	+0,24 -0,24	≤5°

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	$M_{b,pos}$	$M_{b,neg}$
218,9 Nm ² /m	84,4 Nm ² /m	4216 N/m	150,2 Nm/m	57,6 Nm/m

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

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

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

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

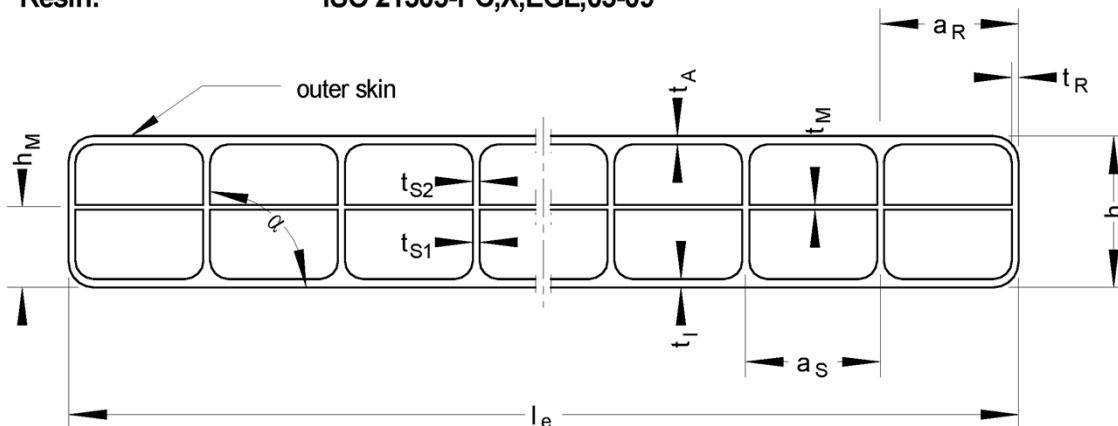
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Hohlkammerscheibe PC 16-5 High Impact"

Annex A 4.8

English translation prepared by DIBt

Sheet: **Exolon multi UV 3/16-16 -980**
Manufacturer: **Exolon Group, Nera Montoro**
Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_M mm	a_S mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_M mm
980	16,1	7,4	15,9	19,7	0,88	0,87	0,41	0,41	0,09
+6 -2	± 0,5	+ 0,3 - 0,35	+ 0,15	+ 0,8	- 0,03	- 0,03	- 0,04	- 0,04	- 0,01

t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,89	2,76	
- 0,11	+ 0,17 - 0,03	≤ 1°

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	$M_{b,pos}$	$M_{b,neg}$
247,8 Nm ² /m	73,6 Nm ² /m	2528 N/m	108,9 Nm/m	103,9 Nm/m

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

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

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

Reaction to fire: Class B-s1,d0 in accordance with EN13501-1
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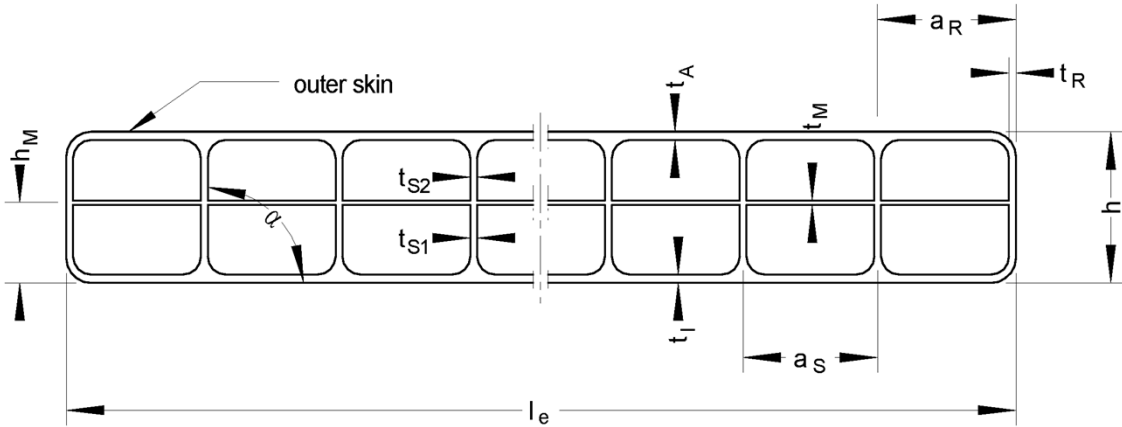
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Exolon multi UV 3/16-16 - 980"

Annex A 4.9

English translation prepared by DIBt

Sheet: Exolon multi UV 3/16-16 - 1200
Manufacturer: Exolon Group, Nera Montoro
Resin: ISO 21305-PC,X,EGL,03-09



l_e mm	h mm	h_M mm	a_S mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_M mm
1200	16,0	7,2	16,2	15,4	0,87	0,89	0,40	0,39	0,11
+6 -2	$\pm 0,5$	+ 0,15 - 0,2	+ 0,1	+ 0,35	- 0,03	- 0,04	- 0,05	- 0,03	- 0,01

t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,70	2,78	
- 0,10	+ 0,17 - 0,02	$\leq 1^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
244,4 Nm ² /m	72,0 Nm ² /m	2042 N/m	109,1 Nm/m	105,1 Nm/m

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

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

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

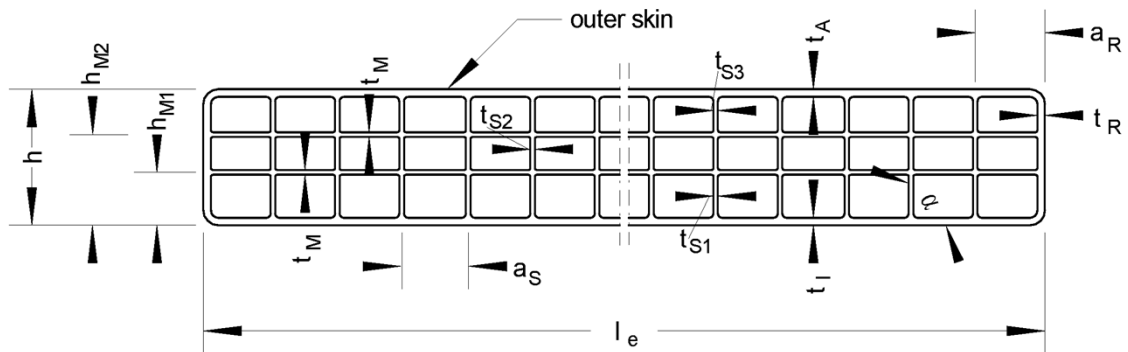
Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Exolon multi UV 3/16-16 - 1200"

Annex A 4.10

Sheet: Exolon multi UV 4/10-6 (as unhardened sheet)
 Manufacturer: Exolon Group S.p.A., Nera Montoro
 Resin: ISO 21305-PC,X,EGL,03-09



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

t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,08	0,26	1,73	
- 0,02	- 0,08	+0,10 - 0,02	$\leq 8^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
49,0 Nm ² /m	23,1 Nm ² /m	2152 N/m	47,4 Nm/m	39,6 Nm/m

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

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

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

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

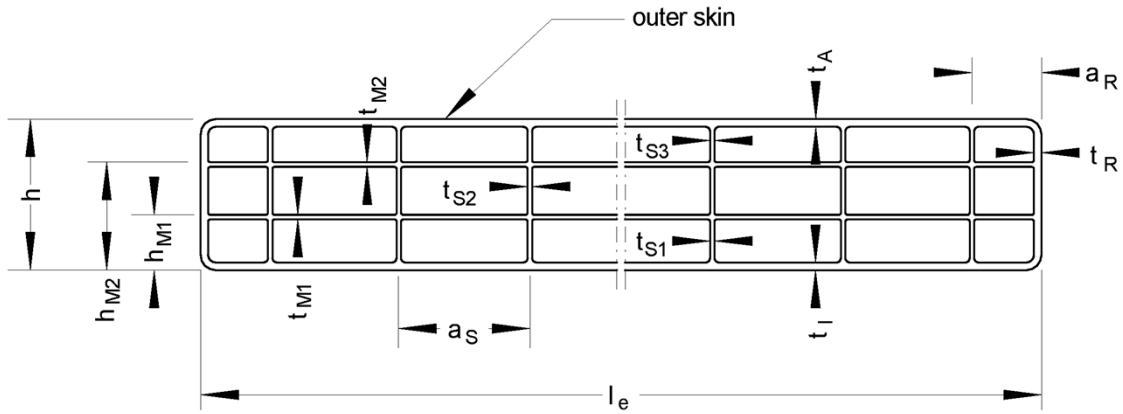
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Exolon multi UV 4/10-6"

Annex A 4.11

English translation prepared by DIBt

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



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

t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,05	0,40	1,73	
- 0,03	- 0,31	+0,10 - 0,10	≤ 13°

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

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

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

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

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

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

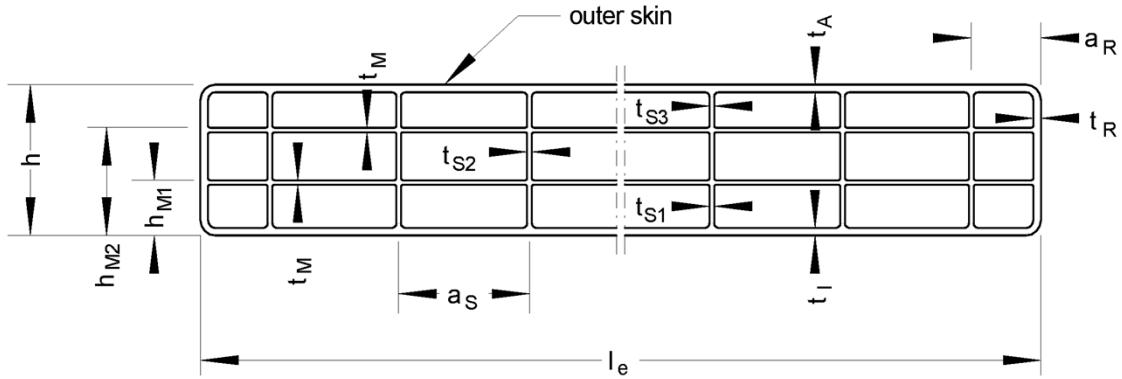
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Akyver Sun Type 10/4w-7 1750"

Annex A 4.12

English translation prepared by DIBt

Sheet: **Macrolux Multiwall LL 4W - 10 mm (as unhardened sheet)**
 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	a_s mm	a_R mm	t_A mm	t_I mm	t_{S1} mm	t_{S2} mm	t_{S3} mm
2100	9,9	2,9	7,8	9,1	7,5	0,41	0,49	0,33	0,25	0,36
+ 6 - 2	± 0,5	+ 0,15 - 0,3	+ 0,3 - 0,3	+ 0,6	+ 1,7	- 0,08	- 0,12	- 0,04	- 0,07	- 0,07

t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,04	0,56	1,69	
- 0,01	- 0,20	+ 0,16 - 0,10	≤ 8°

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

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

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

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

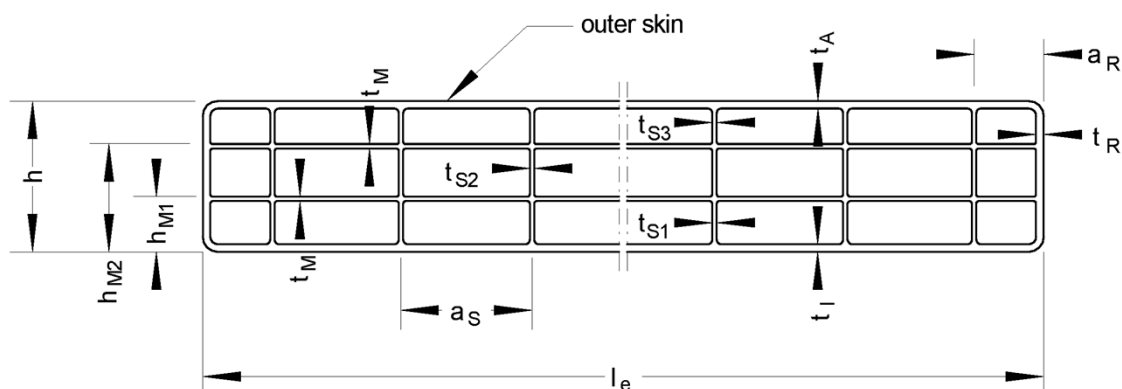
Reaction to fire: Class B-s1,d0 in accordance with EN13501-1

Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Macrolux Multiwall LL 4W - 10 mm"

Annex A 4.13

Sheet: Polycarb 10 mm 4W (as unhardened sheet)
Manufacturer: dott.gallina s.r.l.
Resin: ISO 21305-PC,X,EGL,03-09



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

t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,07	0,30	1,76	
- 0,02	- 0,22	+ 0,11 - 0,07	$\leq 6^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
44,4 Nm ² /m	19,0 Nm ² /m	3135 N/m	46,7 Nm/m	35,7 Nm/m

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

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

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

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

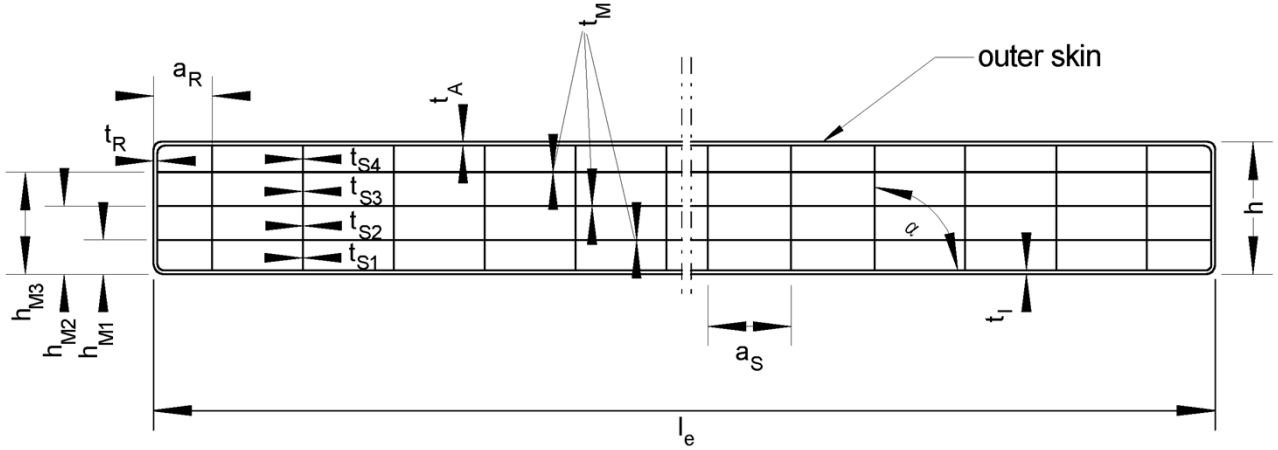
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Polycarb 10 mm 4W"

Annex A 4.14

English translation prepared by DIBt

Sheet: Polcarb 10 mm 5W (as unhardened sheet)
Manufacturer: dott.gallina s.r.l.
Resin: ISO 21305-PC,X,EGL,03-09



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

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_{S4} mm	t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,44	0,40	0,36	0,41	0,07	0,31	1,83	
- 0,06	- 0,04	- 0,08	- 0,06	- 0,01	- 0,11	- 0,12	$\leq 8^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
53,2 Nm ² /m	22,9 Nm ² /m	2448 N/m	57,5 Nm/m	43,8 Nm/m

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

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

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

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

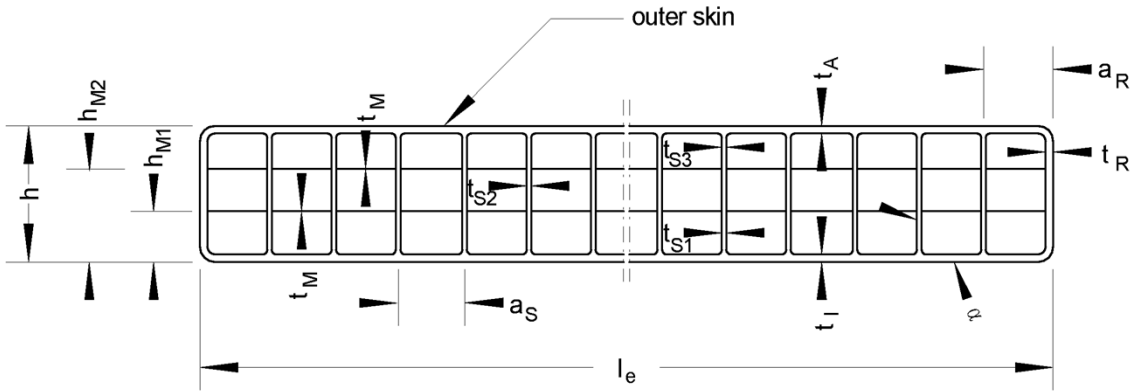
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Polcarb 10 mm 5W"

Annex A 4.15

English translation prepared by DIBt

Sheet: Hohlkammerscheibe PC 10-4 (as unhardened sheet)
 Manufacturer: Rodeca GmbH
 Resin: ISO 7391-PC,EL,61-05-9



l_e mm	h mm	h_{M1} mm	h_{M2} mm	a_S mm	a_R mm	t_A mm	t_I mm
1200	9,9	3,3	6,6	5,9	2,9	0,44	0,42
+ 6 - 2	$\pm 0,5$	+ 0,3 - 0,5	+ 0,3 - 0,2	+ 0,3	+ 1,5	- 0,09	- 0,09

t_{S1} mm	t_{S2} mm	t_{S3} mm	t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,29	0,25	0,28	0,06	0,40	1,85	
- 0,08	- 0,08	- 0,08	- 0,02	- 0,12	+ 0,27 - 0,35	$\leq 8^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
40,7 Nm ² /m	18,1 Nm ² /m	1667 N/m	38,7 Nm/m	32,8 Nm/m

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

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

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

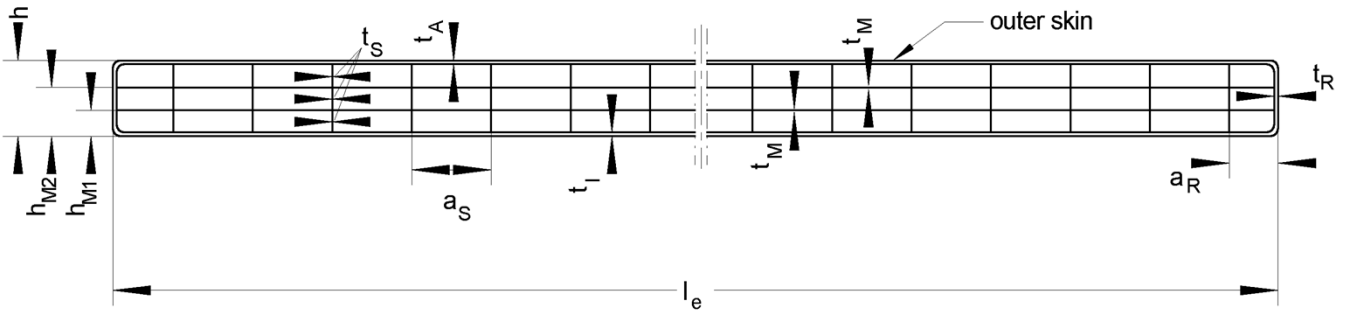
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Hohlkammerscheibe PC 10-4"

Annex A 4.16

English translation prepared by DIBt

Sheet: **IMPEX Multiwall 10/4w (as unhardened sheet)**
 Manufacturer: **Polycasa N.V., Geel**
 Resin: **ISO 21305-PC,X,EGL,03-09**



l_e mm	h mm	h_{M1} mm	h_{M2} mm	a_s mm	a_R mm
2100	9,7	3,6	6,7	9,9	7,4
+6 -2	± 0,5	+0,5 -0,2	+0,4 -0,2	+ 0,2	+ 2,4

t_A mm	t_l mm	t_s mm	t_M mm	t_R mm	difference $ \Delta\alpha $ to 90°	weight per area kg/m ²
0,45	0,53	0,33	0,06	0,57		1,70
-0,08	-0,11	-0,08	-0,01	-0,23	≤ 8°	-0,01

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	$M_{b,pos}$	$M_{b,neg}$
44,1 Nm ² /m	16,9 Nm ² /m	1673 N/m	30,4 Nm/m	34,6 Nm/m

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

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

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

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

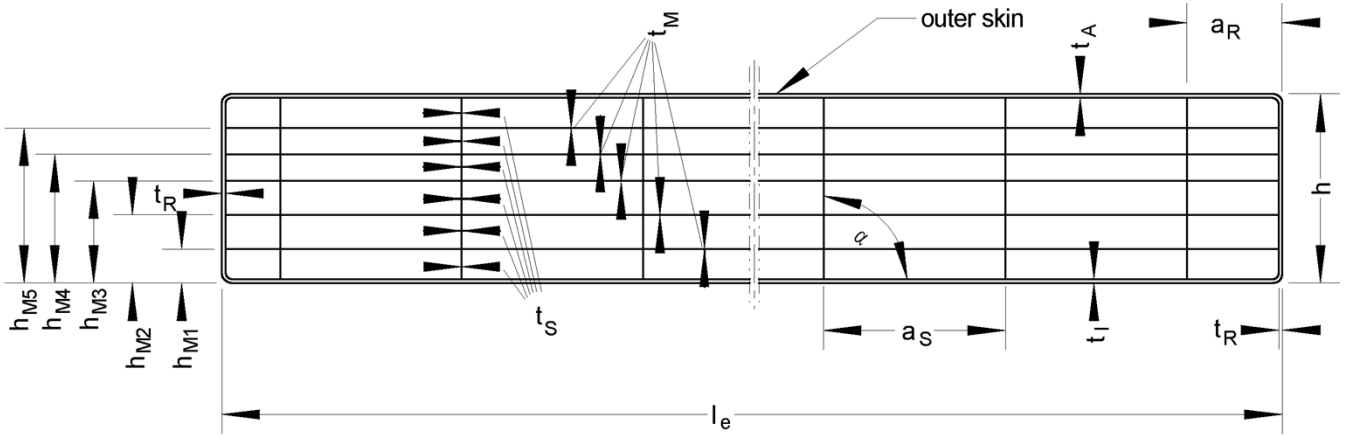
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "IMPEX Multiwall 10/4w"

Annex A 4.17

English translation prepared by DIBt

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



l_e mm	h mm	h_{M1} mm	h_{M2} mm	h_{M3} mm	h_{M4} mm	h_{M5} mm	a_S mm	a_R mm	weight per area kg/m ²
2100	19,6	3,6	6,6	9,6	12,7	16,0	13,9	8,2	2,85
+ 6 - 2	$\pm 0,5$	+ 0,4 - 0,3	+ 0,3 - 0,3	+ 0,3 - 0,4	+ 0,25 - 0,3	+ 0,35 - 0,4	+ 0,95	+ 2,2	+ 0,17 - 0,15

t_A mm	t_I mm	t_S mm	t_M mm	t_R mm	difference $ \Delta\alpha $ to 90°
0,64	0,65	0,34	0,08	0,85	
- 0,08	- 0,10	- 0,09	- 0,03	- 0,39	$\leq 7^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
317 Nm ² /m	56,8 Nm ² /m	1824 N/m	57,6 Nm/m	64,5 Nm/m

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

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

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

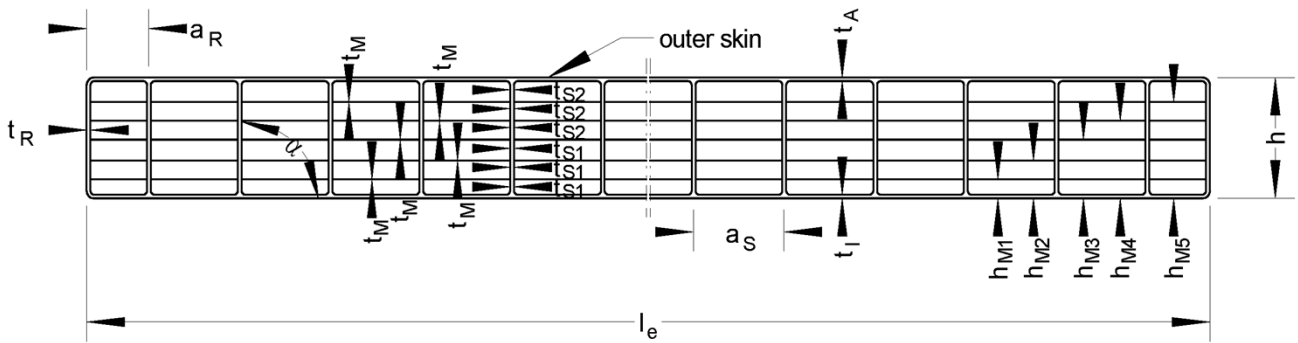
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Exolon multi UV 7/20-14"

Annex A 4.18

English translation prepared by DIBt

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



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

t_{S1} mm	t_{S2} mm	t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,41	0,37	0,07	0,79	2,85	
- 0,02	- 0,04	- 0,01	- 0,04	+ 0,17 - 0,04	$\leq 3^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
317,7 Nm ² /m	100,1 Nm ² /m	2401 N/m	68,4 Nm/m	68,4 Nm/m

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

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

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

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

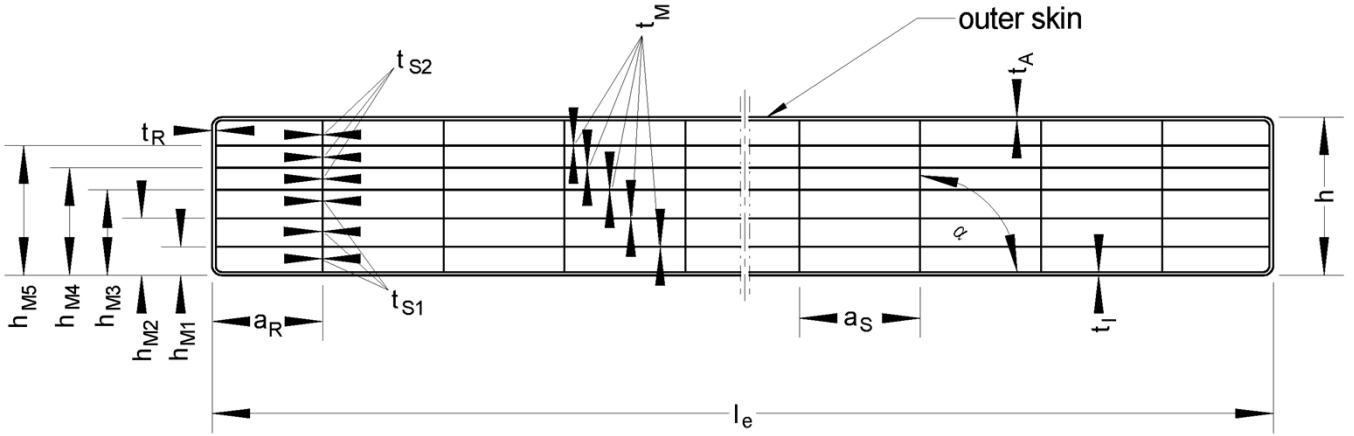
Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Akyver Sun Type 20/7w-12"

Annex A 4.19

English translation prepared by DIBt

Sheet: **Macrolux Multiwall LL 7W - 20mm - 3,1 kg/m²**
 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	20,2	3,3	6,0	8,7	12,3	16,2	15,8	13,8	0,67	0,71
+ 6 - 2	$\pm 0,5$	+ 0,55 - 0,3	+ 0,7 - 0,6	+ 0,75 - 0,6	+ 0,7 - 0,8	+ 0,3 - 0,4	+ 0,35	+ 2,9	- 0,07	- 0,11

t_{S1} mm	t_{S2} mm	t_M mm	t_R mm	weight per area kg/m ²	difference $ \Delta\alpha $ to 90°
0,52	0,36	0,09	0,60	3,08	
- 0,14	- 0,09	- 0,03	- 0,10	+ 0,18 - 0,11	$\leq 3^\circ$

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	$M_{b,pos}$	$M_{b,neg}$
292,7 Nm ² /m	75,1 Nm ² /m	2843 N/m	81,9 Nm/m	76,5 Nm/m

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

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

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

Proline-E
Topline ELS-E

Cross section geometry, weight per area, mechanical performance requirements minimum performance levels or classes in accordance with EN 16153 of the "Macrolux Multiwall LL7W-20mm"

Annex A 4.20

Proline-E

Annex B

Topline ELS-E

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 ψ coefficient defined in EN 1990¹ may be applied. In design situations where the wind is applied as the dominant variable action, the ψ coefficient may be considered in the design value of the structural resistance R_d (see Section B.1.3).

If the roof kit is installed with a substructure angle $\alpha \leq 45^\circ$ in roofs with pitches $\leq 20^\circ$ 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 1991-1-4².

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 γ_M , the factor taking into account the effects of media C_u and the temperature factor C_θ as follows:

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

The following factors shall be applied:

Factor taking into account the effects of media and ageing C_u		1.10
Temperature factor C_θ	Summer (reduction for the temperature effect up to 70°)	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.

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

B 2 Characteristic structural resistances of the covering

Covering "PC 16" – Annexes A 4.1 – A 4.7/ System SpF

Multi-wall sheet in accordance with Annex	Radius $R \geq 1,50\text{m}$ R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m ²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.1 Exolon Multi UV 6/16-20	$\leq 3,00$	1-span	1,070	2,36	2,21	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,29	2,29	2,41	2,41
	$\leq 4,50$		0,535	7,70	7,47	3,10	3,10
	$\leq 3,00$	3-span	0,357	11,8	11,8	4,24	4,24
			0,707	4,26	4,25	3,50	3,50
			0,357	8,67	8,67	3,36	3,36
	$\leq 4,50$		0,707	4,07	4,07	3,36	3,36
			0,530	8,26	8,26	4,24	4,24
	$\leq 4,50$	4-span	0,530	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,24	4,24
	$\leq 4,50$		0,424	8,67	8,67	3,36	3,36
$\leq 3,00$	6-span	0,353	11,8	11,8	4,24	4,24	
$\leq 4,50$		0,353	8,67	8,67	3,36	3,36	
A 4.2 Exolon Multi UV 7/16-14	$\leq 3,00$	1-span	1,070	2,36	2,25	2,18	2,04
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,08	3,08
			1,060	2,34	2,34	2,46	2,46
	$\leq 4,50$		0,535	7,70	7,47	3,08	3,08
	$\leq 3,00$	3-span	0,357	11,8	11,8	4,33	4,33
			0,707	4,37	4,37	3,57	3,57
			0,530	8,67	8,67	3,43	3,43
	$\leq 4,50$		0,530	4,15	4,15	3,43	3,43
	$\leq 3,00$	4-span	0,357	8,42	8,42	4,33	4,33
	$\leq 4,50$		0,707	7,70	7,47	3,08	3,08
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,33	4,33
	$\leq 4,50$		0,424	8,67	8,67	3,43	3,43
$\leq 3,00$	6-span	0,353	11,8	11,8	4,33	4,33	
$\leq 4,50$		0,353	8,67	8,67	3,43	3,43	

The multi-wall sheets must be preformed warm at the manufacturer for bending radii of $1.5 \text{ m} \leq R < 2.4 \text{ m}$.

If the support width b_a is increased from 18 mm to 25 mm, the characteristic values of structural resistance load can be increased by 15 %.

Multi-wall sheet in accordance with Annex	Radius $R \geq 1,50\text{m}$ R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m ²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.3 AkyVer Sun Type 16/7w-12 2600	$\leq 3,00$	1-span	1,070	2,36	2,25	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,57	2,57	2,70	2,70
	$\leq 4,50$		0,535	7,70	7,47	3,10	3,10
	$\leq 3,00$	3-span	0,357	11,8	11,8	4,39	4,39
			0,707	4,81	4,81	3,90	3,90
			0,357	8,67	8,67	3,77	3,77
	$\leq 4,50$		0,707	4,56	4,56	3,77	3,77
	$\leq 3,00$	4-span	0,530	9,26	9,26	4,39	4,39
	$\leq 4,50$		0,530	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,39	4,39
$\leq 4,50$		0,424	8,67	8,67	3,77	3,77	
$\leq 3,00$	6-span	0,353	11,8	11,8	4,39	4,39	
$\leq 4,50$		0,353	8,67	8,67	3,77	3,77	
A 4.4 Macrolux Multiwall LL 7W 16mm 2600	$\leq 3,00$	1-span	1,070	2,36	2,25	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,23	2,23	2,34	2,34
	$\leq 4,50$		0,535	7,70	7,47	3,10	3,10
	$\leq 3,00$	3-span	0,357	11,8	11,8	4,13	4,13
			0,707	4,17	4,17	3,41	3,41
			0,530	8,67	8,67	3,27	3,27
	$\leq 4,50$		0,530	3,95	3,95	3,27	3,27
	$\leq 3,00$	4-span	0,357	8,03	8,03	4,13	4,13
	$\leq 4,50$		0,707	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,13	4,13
$\leq 4,50$		0,424	8,67	8,67	3,27	3,27	
$\leq 3,00$	6-span	0,353	11,8	11,8	4,13	4,13	
$\leq 4,50$		0,353	8,67	8,67	3,27	3,27	

The multi-wall sheets must be preformed warm at the manufacturer for bending radii of $1.5 \text{ m} \leq R < 2.4 \text{ m}$.

If the support width b_a is increased from 18 mm to 25 mm, the characteristic values of structural resistance load can be increased by 15 %.

Multi-wall sheet in accordance with Annex	Radius $R \geq 1,50\text{m}$ R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m ²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.5 Macrolux Multiwall LL 7W 16mm 2700	$\leq 3,00$	1-span	1,070	2,36	2,25	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,36	2,36	2,58	2,58
	$\leq 4,50$		0,535	7,70	7,47	3,10	3,10
	$\leq 3,00$	3-span	0,357	11,8	11,8	4,55	4,55
			0,707	4,41	4,41	3,76	3,76
			0,357	8,67	8,67	3,61	3,61
	$\leq 4,50$		0,707	4,18	4,18	3,61	3,61
	$\leq 3,00$	4-span	0,530	8,49	8,49	4,55	4,55
	$\leq 4,50$		0,530	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,55	4,55
$\leq 4,50$	0,424		8,67	8,67	3,61	3,61	
$\leq 3,00$	6-span	0,353	11,8	11,8	4,55	4,55	
$\leq 4,50$		0,353	8,67	8,67	3,61	3,61	
A 4.6 Policarb 16mm 6W	$\leq 3,00$	1-span	1,070	2,36	2,21	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,46	2,46	2,70	2,70
	$\leq 4,50$		0,535	7,70	7,70	3,10	3,10
	$\leq 3,00$	3-span	0,357	11,8	11,8	4,76	4,76
			0,707	4,50	4,50	3,93	3,93
			0,530	8,67	8,67	3,77	3,77
	$\leq 4,50$		0,530	4,56	4,56	3,77	3,77
	$\leq 3,00$	4-span	0,357	9,26	9,26	4,76	4,76
	$\leq 4,50$		0,707	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,76	4,76
$\leq 4,50$	0,424		8,67	8,67	3,77	3,77	
$\leq 3,00$	6-span	0,353	11,8	11,8	4,76	4,76	
$\leq 4,50$		0,353	8,67	8,67	3,77	3,77	

The multi-wall sheets must be preformed warm at the manufacturer for bending radii of $1.5 \text{ m} \leq R < 2.4 \text{ m}$.

If the support width b_a is increased from 18 mm to 25 mm, the characteristic values of structural resistance load can be increased by 15 %.

Multi-wall sheet in accordance with Annex	Radius $R \geq 1,50\text{m}$ R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m ²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.7 Policarb 16mm 7W	$\leq 3,00$	1-span	1,070	2,36	2,25	2,05	1,91
	$\leq 3,00$	2-span	0,535	7,70	7,47	2,90	2,90
			1,060	2,20	2,20	2,31	2,31
			0,535	7,70	7,47	2,90	2,90
	$\leq 4,50$	3-span	0,357	11,8	11,8	4,08	4,08
			0,707	4,12	4,12	3,37	3,37
			0,357	8,67	8,67	3,23	3,23
	$\leq 4,50$	3-span	0,707	3,91	3,91	3,23	3,23
			0,707	3,91	3,91	3,23	3,23
	$\leq 3,00$	4-span	0,530	7,93	7,93	4,08	4,08
	$\leq 4,50$		0,530	7,70	7,47	2,90	2,90
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,08	4,08
	$\leq 4,50$		0,424	8,67	8,67	3,23	3,23
	$\leq 3,00$	6-span	0,353	11,8	11,8	4,08	4,08
$\leq 4,50$	0,353		8,67	8,67	3,23	3,23	

Covering "PC 20" – Annexes A 4.18 – A 4.20/ System SpF

A 4.18 Exolon multi UV 7/20-14	$\leq 3,00$	1-span	1,070	2,36	2,19	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,46	2,46	2,70	2,70
			0,535	7,70	7,70	3,10	3,10
	$\leq 4,50$	3-span	0,357	11,8	11,8	4,76	4,76
			0,707	4,56	4,56	3,93	3,93
			0,530	8,67	8,67	3,77	3,77
	$\leq 4,50$	3-span	0,530	4,42	4,42	3,77	3,77
			0,530	4,42	4,42	3,77	3,77
	$\leq 3,00$	4-span	0,357	8,98	8,98	4,76	4,76
	$\leq 4,50$		0,707	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,76	4,76
	$\leq 4,50$		0,424	8,67	8,67	3,77	3,77
	$\leq 3,00$	6-span	0,353	11,8	11,8	4,76	4,76
$\leq 4,50$	0,353		8,67	8,67	3,77	3,77	

The multi-wall sheets must be preformed warm at the manufacturer for bending radii of $1.5 \text{ m} \leq R < 2.4 \text{ m}$.

If the support width b_a is increased from 18 mm to 25 mm, the characteristic values of structural resistance load can be increased by 15 %.

Multi-wall sheet in accordance with Annex	Radius $R \geq 1,50\text{m}$ R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m ²]			
				downward load		uplift load	
				R_k	C_k	R_k	C_k
A 4.19 AkyVer Sun Type 20/7w-12	$\leq 3,00$	1-span	1,070	2,36	2,25	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,55	2,55	2,70	2,70
			0,535	7,70	7,47	3,10	3,10
	$\leq 4,50$	3-span	0,357	11,8	11,8	4,76	4,76
			0,707	4,77	4,77	3,93	3,93
			0,357	8,67	8,67	3,77	3,77
	$\leq 4,50$	3-span	0,707	4,52	4,52	3,77	3,77
			0,707	4,52	4,52	3,77	3,77
	$\leq 3,00$	4-span	0,530	9,18	9,18	4,76	4,76
	$\leq 4,50$		0,530	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,76	4,76
	$\leq 4,50$		0,424	8,67	8,67	3,77	3,77
	$\leq 3,00$	6-span	0,353	11,8	11,8	4,76	4,76
$\leq 4,50$	0,353		8,67	8,67	3,77	3,77	
A 4.20 Macrolux Multiwall LL 7W 20mm	$\leq 3,00$	1-span	1,070	2,36	2,23	2,19	2,05
	$\leq 3,00$	2-span	0,535	7,70	7,47	3,10	3,10
			1,060	2,57	2,57	2,70	2,70
			0,535	7,70	7,47	3,10	3,10
	$\leq 4,50$	3-span	0,357	11,8	11,8	4,76	4,76
			0,707	4,81	4,81	3,93	3,93
			0,530	8,67	8,67	3,77	3,77
	$\leq 4,50$	3-span	0,530	4,56	4,56	3,77	3,77
			0,530	4,56	4,56	3,77	3,77
	$\leq 3,00$	4-span	0,357	9,26	9,26	4,76	4,76
	$\leq 4,50$		0,707	7,70	7,47	3,10	3,10
	$\leq 3,00$	5-span	0,424	11,8	11,8	4,76	4,76
	$\leq 4,50$		0,424	8,67	8,67	3,77	3,77
	$\leq 3,00$	6-span	0,353	11,8	11,8	4,76	4,76
$\leq 4,50$	0,353		8,67	8,67	3,77	3,77	

The multi-wall sheets must be preformed warm at the manufacturer for bending radii of $1.5 \text{ m} \leq R < 2.4 \text{ m}$.

If the support width b_a is increased from 18 mm to 25 mm, the characteristic values of structural resistance load can be increased by 15 %.

Covering "PC 16" – Annexes A 4.1 – A 4.10/ System SiD

Multi-wall sheet in accordance with Annex	Radius $R \geq 1,50\text{m}$ R [m]	System	a_p [m]	Characteristic values of structural resistance [kN/m ²]					
				downward load		uplift load			
				R_k	C_k	R_k	C_k		
A 4.1 Exolon Multi UV 6/16-20 A 4.2 Exolon Multi UV 7/16-14 A 4.3 AkyVer Sun Type 16/7w-12 2600 A 4.4 Macrolux Multiwall LL 7W 16mm 2600 A 4.5 Macrolux Multiwall LL 7W 16mm 2700 A 4.6 Policarb 16mm 6W A 4.7 Policarb 16mm 7W	$\leq 3,5$	2-span	0,500	7,70	7,47	3,10	3,10		
			0,610	6,16	5,98	2,48	2,48		
		3-span	0,333	8,67	8,67	3,43	3,43		
			0,407	6,94	6,94	2,74	2,74		
				6,94	6,94	2,74	2,74		
		A 4.8 Hohlkammerscheibe PC 16-5 High Impact	$\leq 3,5$	1-span	1,000	4,81	2,61	1,61	1,61
					1,200	3,41	2,41	1,82	1,82
2-span	0,500			7,70	7,47	3,10	3,10		
	0,610			6,16	5,98	2,48	2,48		
3-span	0,333			8,67	8,67	3,43	3,43		
	0,407			6,94	6,94	2,74	2,74		
A 4.9 Exolon Multi UV 3/16-16 980	$\leq 3,5$	1-span	1,000	4,00	2,17	1,51	1,51		
		2-span	0,500	7,70	7,47	3,10	3,10		
		3-span	0,333	8,67	8,67	3,43	3,43		
A 4.10 Exolon Multi UV 3/16-16 1200	$\leq 3,5$	1-span	1,200	3,14	2,22	1,68	1,68		
		2-span	0,610	6,16	5,98	2,48	2,48		
		3-span	0,407	6,94	6,94	2,74	2,74		

The multi-wall sheets must be preformed warm at the manufacturer for bending radii of $1.5 \text{ m} \leq R < 2.4 \text{ m}$.

If the support width b_a is increased from 18 mm to 25 mm, the characteristic values of structural resistance load can be increased by 15 %.

B 3 Load-bearing capacity and serviceability of the impost

B 3.1 General

The action of snow (downward load) and wind loads (downward and uplift loads) act on the covering and is transferred to the curved profiles (bearing profiles or covering profiles).

The covering profiles act either as tension strips which are only attached to the impost ("SpF" system) or by means of a regular screw connection directly together with the support profiles ("SiD" system).

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

$$\frac{F_{Z,E,d}}{F_{Z,R,d}} \leq 1,0 \quad \text{and} \quad \frac{F_{D,E,d}}{F_{D,R,d}} \leq 1,0$$

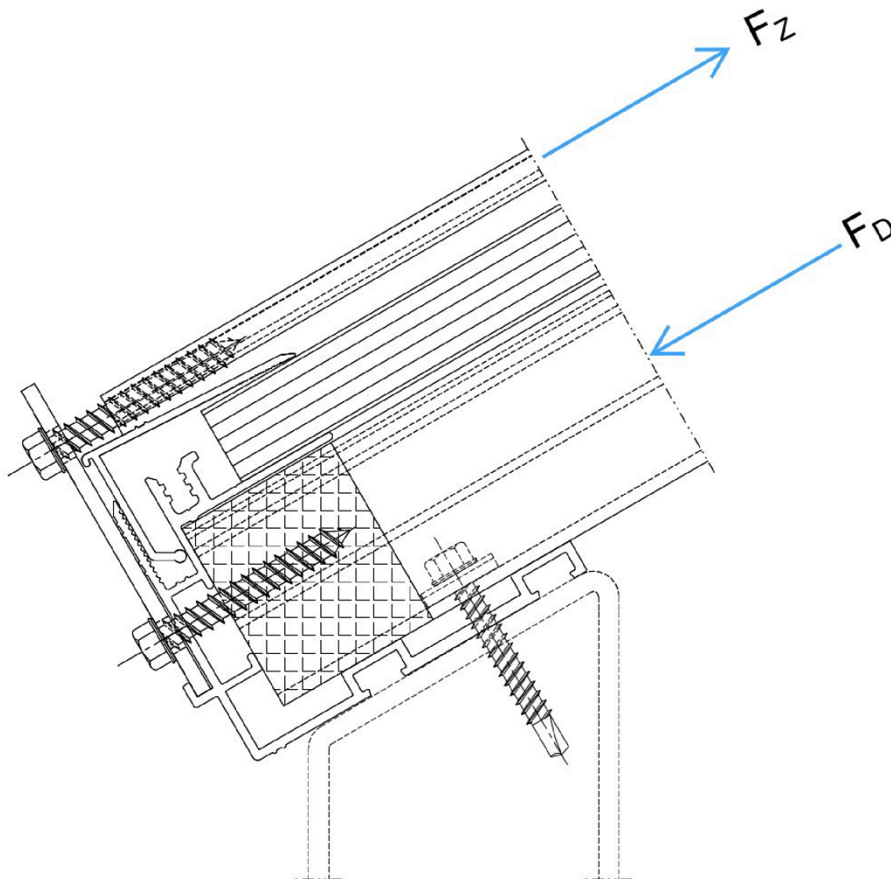
$F_{Z,E,d}$; $F_{D,E,d}$:

design value of the action

$F_{Z,R,d}$; $F_{D,R,d}$:

design value for structural resistance

shall apply.



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

B 3.2 Design values for actions, $F_{Z,E,d} / F_{D,E,d}$

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.

B 3.3 Design values for structural resistance R_d general

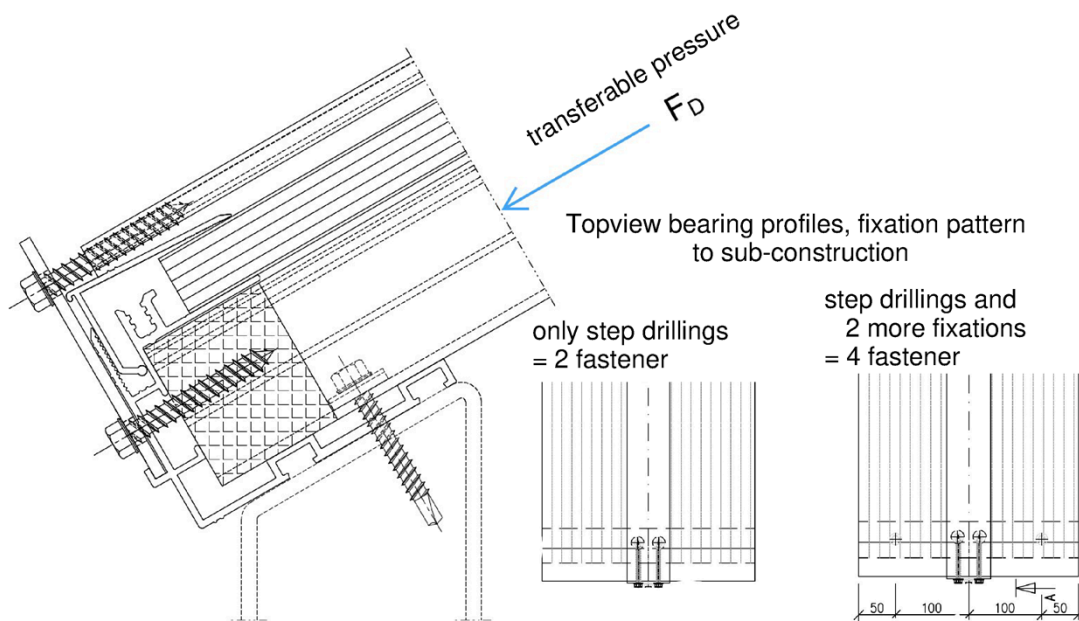
The design values for structural resistance R_d result from the characteristic value of structural resistance R_k in consideration of the material safety factor γ_M as follows:

$$R_d = \frac{R_k}{\gamma_{MR}}$$

B 3.3.1 Design values for structural resistance against pressure

The design values for structural resistance $F_{D,R,d}$ result from the characteristic value of structural resistance $F_{D,R,k}$ in consideration of the material safety factors γ_{MR} :

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



Design values for structural resistance against pressure

Design			Design values for structural resistance [kN] (with $\gamma_{MR} = 1,25$)
Impost profile	Number of fastenings	Connecting devices	$F_{D,R,d}$
65-1 SpF (Pro) 65-2 SpF (ELS) 65 SiD	2	Material Nr. 1.1147	13,52
	2	Material Nr. 1.4301 (A2 acc. to EN ISO 3506)	9,04
	4	Material Nr. 1.1147	19,44
40 SpF 40 SiD	2	Material Nr. 1.1147 oder Material Nr. 1.4301 (A2 acc. to EN ISO 3506)	15,00
25 SpF 25 SiD	2	Material Nr. 1.1147	10,50
	2	Material Nr. 1.4301 (A2 acc. to EN ISO 3506)	8,25

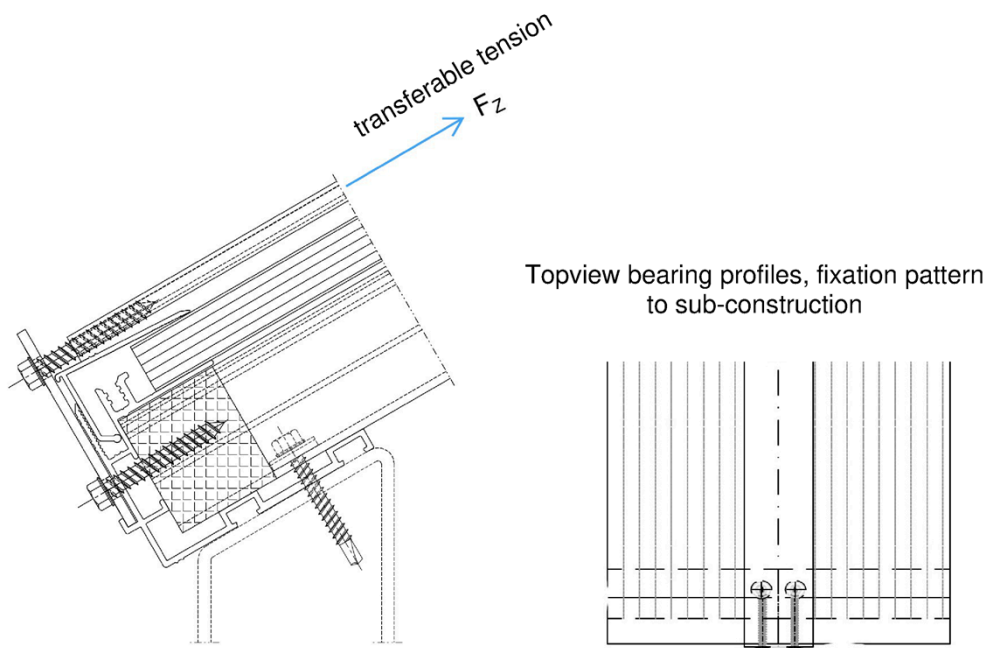
Design of the step drilling in accordance with Annex A 2.7.

B 3.3.2 Design values for structural resistance against tension

The design values for structural resistance $F_{Z,R,d}$ result from the characteristic value of structural resistance $F_{Z,R,k}$ in consideration of the material safety factors γ_{MR} and γ_{MC} :

$$F_{Z,R,d} = \frac{F_{Z,R,k}}{\gamma_{MR}}$$

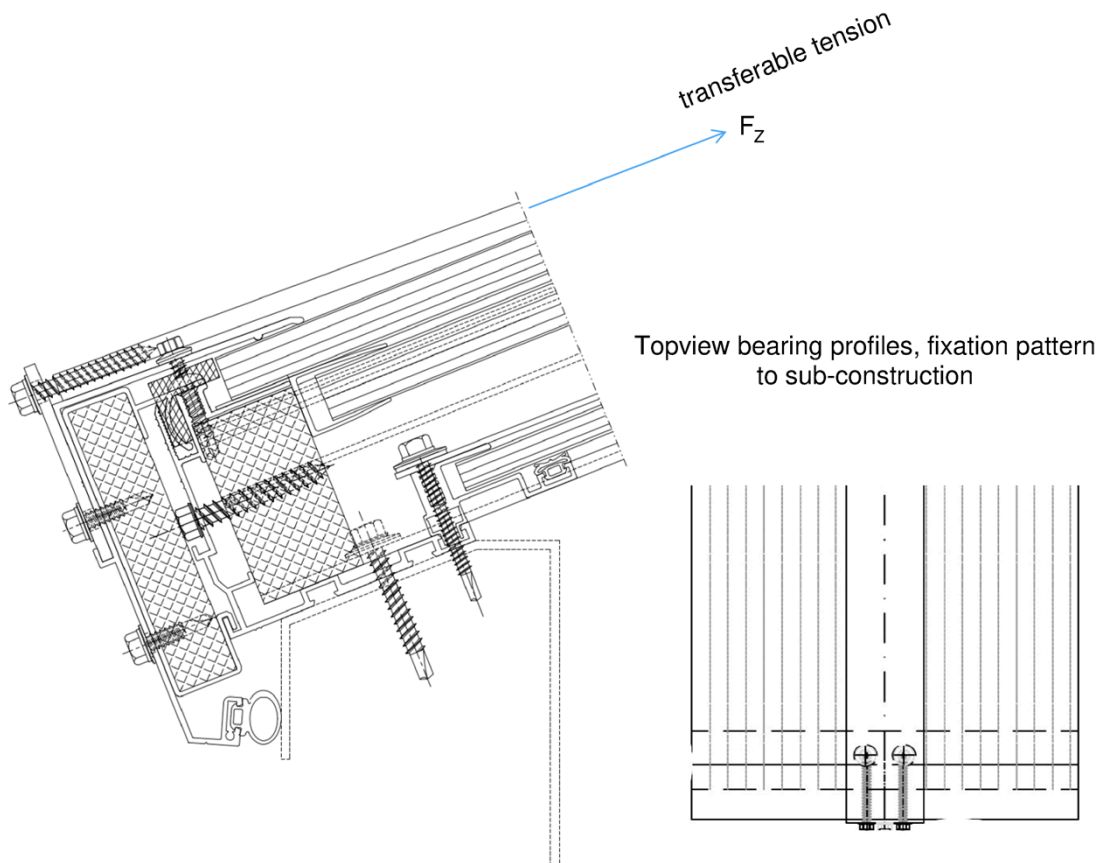
a) "Proline -E"



"Proline-E": Design values for structural resistance against tension

Design			Design values for structural resistance [kN] (with $\gamma_{MR} = 1,1$)	Requirement for the tensile yield strength
Impost profile	Connecting devices	Fixing bracket	$F_{Z,R,d}$ [kN]	N/mm ²
65-1 SpF (Pro) 25 SpF 40 SpF	Material Nr. 1.1147 or Material Nr. 1.4301 (A2 acc. to EN ISO 3506)	Typ 2	3,72	277
		Typ 3	4,59	320

b) "Topline ELS-E"



"Topline ELS- E": Design values for structural resistance against tension

Design				Design values for structural resistance [kN] (with $\gamma_{MR} = 1,25$)
Impost profile	Fixing clip profile - ELS adapter	Fasteners to the substructure	Fixing bracket	$F_{Z,R,d}$
65-1 SpF (Pro) 65-2 SpF	Standard	Material Nr. 1.1147 or Material Nr. 1.4301 (A2 acc. To EN ISO 3506)	Typ 1	5,09
	WL plus			5,94
40 SpF 25 SpF	Standard		Typ 2	4,05
	WL plus		Typ 3	5,24

**,Proline -E
Topline ELS-E**

Annex C

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

C 1 Installation

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 groundplan shape. The compliance of the existing substructure with the substructure for which the load-bearing capacity was verified in the planning stage shall be checked visually.

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

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

The main components of the roofkit are extruded aluminum profiles and multi wall sheets. First, the aluminum bearing profiles and impost profiles are mounted on an existing substructure. The arrangement of the bearing profiles creates single and multi-span systems for the multi wall sheets with a maximum support distance a_P in accordance with Annex A 1. Adapters with a maximum support distance a_{PR} in accordance with Annex A 1 may be installed as a single-span system without central support. If necessary, the multi-skin sheets must be secured against lifting loads with cover profiles above the support profiles.

Only connecting devices in accordance with section 1.1.11 are used to connect the aluminum profiles.

The multi wall sheets are joined at the longitudinal edges over a bearing profile; the support width must be at least 18 mm. The maximum panel width is 2100 mm. The panels are held in the support area so that they can slide. At the impost, the multi-skin sheets must be slidably held in the support profiles over a width of at least 20 mm.

For versions with 10 mm or 16 mm thick suspended multi wall sheets between the support profiles, these must be supported at least 19 mm in accordance with annex A 2.3 and A 2.4.

If aluminum sheets, GRP sheets or solid sheets are used due to requirements, the multi-skin sheets must be fully covered (including support areas).

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

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

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

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