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European Technical Assessment

ETA 20/0958
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General part

Technical Assessment Body issuing the ETA: ITeC ITeC has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment)	
Trade name of the construction product	**PF-ALT-SOV kit**
Product family to which the construction product belongs	Kits for external wall claddings glued to the subframe
Manufacturer	**MECANISMOS, ANCLAJES Y SISTEMAS AUTOPORTANTES SL - MASA** C/ Compositor Bach, 14-16 Pol. Ind. Can Jardí ES-08191 RUBÍ Barcelona, Spain
Manufacturing plant(s)	C/ Compositor Bach, 14-16 Pol. Ind. Can Jardí ES-08191 RUBÍ Barcelona, Spain
This European Technical Assessment contains	48 pages including 4 annexes which form an integral part of this assessment and the Annex N, which contains the updated list of the cladding element trade names intended to be used with the product covered by this ETA.
This European Technical Assessment is issued in accordance with Regulation (EU) 305/2011, on the basis of	European Assessment Document, EAD 090097-00-0404 *Kits for external wall claddings glued to the subframe.*

General comments

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Specific parts of the European Technical Assessment

1 Technical description of the product

PF-ALT-SOV kit (PF-ALT-SO, PF-ALT-SV and PF-AL-TH/SOV assembled systems) is a subframe and adhesive kit (Type B according to EAD 090097-00-0404) for fastening cladding elements.

PF-ALT-SOV kit components are given in table 1.1.

Detailed information and data of all the components are given in the annexes of this ETA.

Fixings between brackets and substrate are not part of the kit assessed in this ETA.

Table 1.1: Kit components.

N.	Generic component			PF-ALT-SOV (*)	Technical description
1	Cladding fixing	Adhesive system	Adhesive	SikaTack® Panel-50 One component silicone-based adhesive. Design characteristics are given in table 1.2.	Annex 2
			Primer	SikaTack® Panel-Primer Liquid consistency primer for the treatment of surfaces (porous and non-porous)	
			Ancillary components	SikaTack® Panel-Tape: double-sided adhesive closed-cell polyethylene spacer tape. Sika® Aktivator-205: Surface pre-treatment and cleaning agent.	
		Supplementary mechanical cladding fixings	Clips	Stainless steel clips	Annex 3
2	Subframe	Vertical profile and/or horizontal profile		Aluminium alloy profiles	
		Bracket		Aluminium alloy brackets	
		Subframe fixings		Stainless steel screws	
		Ancillary components		Aluminium alloy profiles	
				Thermal bridge break piece	

(*) Kit belonging to type B according to EAD 090097-00-0404.

The configuration of the assembled system is shown in Annex 1.

The PF-ALT-SOV kit is a non-load bearing construction element. It does not contribute to the stability of the structure on which it is installed.

The following ventilated façade elements or components are not considered in this ETA:

- The cladding elements.
- The fixings between the subframe and the supporting structure[1].
- The other layers of the façade, like insulation and internal layers.

[1] The term “supporting structure” refers to both of following descriptions:

- The wall, which in itself already meets the airtightness and mechanical strength requirements (resistance to static and dynamic loads). The substrate walls are made of masonry (clay, concrete or stone), concrete (cast on site or as prefabricated panels), timber or metal frame.
- The supporting structure of the building, which in itself does not meet the airtightness requirement but meets the mechanical strength requirements (resistance to static and dynamic loads). Usually, the supporting structures of the building are made of concrete (cast on site or prefabricated), timber or metal frame. In this case, the airtightness requirements are met by the internal leaves of the façade.

Table 1.2: SikaTack® Panel-50 Adhesive design characteristics.

Characteristic	Value
Thickness	e = 3,0 mm
Adhesive bead (bite)	b ≥ 12,0 mm
Maximum design tensile stress	σ_{des} = 0,15 MPa
Maximum design shear stress	τ_{des} = 0,012 MPa
Maximum hygrothermal displacement in dynamic shear	$\Delta L_{s,des}$ = 1,35 mm

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

PF-ALT-SOV kit is intended to be used as subframe and adhesive fixings (kit type B according to EAD 090097-00-0404) of opaque cladding elements for external walls in ventilated façades (rainscreens), intended to be used on supporting structures[1] which meet the mechanical strength requirements.

Materials of cladding elements and subframe profiles intended to be used with PF-ALT-SOV kit are given in table 2.1.

Table 2.1: Materials of cladding elements and subframe profiles.

Generic type of material (*)	European technical specification reference
HPL laminates	EN 438-7
Ceramic tiles	EN 14411
TMCS - Thin metal composite sheets	EAD 210046-00-1201
Anodised aluminium and aluminium mill finish	EN 755 & EN 1999-1

(*) Each specific type of cladding element material and subframe profile material to be used on-site should be verified, at least, by means of the peel test according to clause 3.4.2.1 of EAD 090097-00-0404. Annex N of this ETA 20/0958 includes the specific cladding element trade names accepted by the manufacturer to be used with PF-ALT-SOV kit. The assessment of the cladding elements is not covered by this ETA (kit type B according to EAD 090097-00-0404). This Annex N is kept conveniently updated by ITeC.

The cladding elements are not part of the kit object of this ETA. The safety in use of the cladding elements must be assessed separately.

The provisions made in this European Technical Assessment are based on an assumed working life of at least 25 years for PF-ALT-SOV kit. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

PF-ALT-SOV kit is made of non-load bearing construction components. They do not contribute directly to the stability of the wall on which they are installed.

PF-ALT-SOV kit is not intended to ensure the airtightness of the building envelope.

Detailed information and data regarding design, installation, maintenance and repair criteria are given in Annex 4.

3 Performance of the product and reference to the methods used for its assessment

The assessment of PF-ALT-SOV kit for the intended use was performed following the EAD 090097-00-0404 *Kit for external wall claddings glued to the subframe*.

Table 3.1: Summary of the PF-ALT-SOV kit performance (see also detailed performances in relevant clauses).

Product:	PF-ALT-SOV kit	**Intended use:**	Subframe and adhesive fixing of opaque cladding elements for external walls in ventilated façades (rainscreens)

Basic Works Requirement	**ETA clause**	**Essential characteristic**		**Performance**
BWR 2 Safety in case of fire	---	Reaction to fire		Not assessed
	---	Façade fire performance		Not relevant for kit type B
	---	Propensity to undergo continuous smouldering		Not assessed
BWR 3 Hygiene, health and the environment	---	Watertightness of joints (protection against driving rain)		Not relevant for kit type B
	---	Water absorption		Not relevant for kit type B
	---	Water vapour permeability		Not relevant for kit type B
	---	Drainability		Not relevant for kit type B
	----	Content and/or release of dangerous substances		Not assessed
BWR 4 Safety and accessibility in use	3.1	Wind suction load resistance		4000 Pa
	---	Impact resistance		Not relevant for kit type B
	---	Bending strength of the cladding element		Not relevant for kit type B
	3.2	Initial mechanical resistance of the glued connection	Tensile stress at normal temperature (+ 23 ºC)	$\sigma_{u,c}$ = 1,45 MPa
			Shear stress at normal temperature (+ 23 ºC)	Not assessed
	3.3	Residual mechanical resistance of the glued connection	Tensile stress at high temperature (+ 80 ºC)	$\sigma_{u,c}$ = 1,47 MPa
			Tensile stress at low temperature (- 20 ºC)	$\sigma_{u,c}$ = 1,39 MPa
			Tensile stress after ageing under temperature and high humidity	$\sigma_{u,c}$ = 0,97 MPa
			Tensile stress after immersion in water	$\sigma_{u,c}$ = 1,31 MPa
			Tensile stress after ageing under high humidity and NaCl atmosphere	$\sigma_{u,c}$ = 1,32 MPa
			Tensile stress after ageing under high humidity and SO_2 atmosphere	$\sigma_{u,c}$ = 1,00 MPa
			Tensile stress after cyclic tensile loads	$\sigma_{u,c}$ = 1,12 MPa
			Tensile stress after cyclic shear loads	$\sigma_{u,c}$ = 1,24 MPa $S_{t,m}$ = 9,7%
			Shear creep and climatic ageing	$S_{tv,c}$ = 0,52 mm
			Tear resistance	$\sigma_{u,c}$ = 0,95 MPa
			Effects of materials in contact	$\sigma_{u,c}$ = 0,95 MPa
	3.4	Resistance of profiles		See Annex 3
	3.5	Pull-out resistance of subframe fixings		See table 3.5
	3.6	Shear load resistance of subframe fixings		See table 3.5
	3.7	Bracket resistance (horizontal and vertical load)		See tables 3.6a and 3.6b
	3.8	Mechanical resistance of supplementary mechanical cladding fixings		See tables 3.7a and 3.7b
BWR 5 Protection against noise	---	Airborne sound insulation		Not relevant for kit type B

Table 3.1: Summary of the PF-ALT-SOV kit performance (see also detailed performances in relevant clauses).

Product:	PF-ALT-SOV kit	**Intended use:**	Subframe and adhesive fixing of opaque cladding elements for external walls in ventilated façades (rainscreens)

Basic Works Requirement	**ETA clause**	**Essential characteristic**	**Performance**
BWR 6 Energy economy and heat retention	---	Thermal resistance	Not relevant (kit without thermal insulation in ventilated façade)
Durability	---	Hygrothermal behaviour	Not relevant for kit type B
	---	Freeze-thaw resistance	Not assessed
	3.9	Behaviour after immersion in water	See table 3.3
	---	Dimensional stability by humidity	Not relevant for kit type B
	3.10	Linear thermal expansion	See clause 3.10
	---	Chemical and biological resistance	Not relevant for kit type B
	---	UV radiation resistance	Not relevant for kit type B
	3.11	Corrosion	See clause 3.11
	---	Accelerated ageing behaviour of kits when the cladding element is made of TMCS	Not relevant for kit type B

Complementary information:

Requirements with respect to the mechanical resistance and stability of non-load bearing parts of the works are not included in the Basic Works Requirement *Mechanical resistance and stability* (BWR 1) but are treated under the Basic Works Requirement *Safety and accessibility in use* (BWR 4).

The fire resistance requirement is applicable to the wall (made of masonry, concrete, timber or metal frame) and not to the PF-ALT-SOV kit itself.

3.1 Wind load resistance

PF-ALT-SOV kit wind load resistance has been determined according to clause 2.2.4 of EAD 090097-00-0404.

Calculations have been carried out for the mechanically weakest case considering the mechanical resistance of the kit components (see clauses 3.2 to 3.9). In addition, this calculated result has been contrasted by testing according to the method given in clause 2.2.4 of EAD 090097-00-0404.

Table 3.2: Test results and calculated values for tested specimen.

Test results				**Calculated values**	
Test	**Maximum load Q (Pa)**	**Deflection under maximum load (mm)**	**Deflection after 1 min recovery (mm)**	**Load (Pa)** (7)	
				1 span	**≥ 2 spans**
Suction - vertical profile config. (1)	4000 (3)	9,8 (4)	0,6 (5)	3890 (8)	1560 (9)
Suction - horizontal profile config. (2)		7,8 (6)	0,5 (6)	> 4000	

(1) Tested specimen of vertical profile configuration: three vertical profiles 750 mm (maximum distance) span; cladding elements, two 1500 mm x 600 mm tiles with two spans (three vertical supports) and two 750 mm x 600 mm tiles with one span (simply supported); two brackets 1300 mm span for each vertical profile. Used adhesive system: SikaTack® Panel-50 with adhesive bead of 12 mm x 486 mm x 3 mm (width x length x thickness) on vertical profiles (one bead on each tile support). Characteristics of components are indicated in Annexes 2 and 3.

(2) Tested specimen of horizontal profile configuration: five horizontal profiles 890 mm long (supported by two vertical profiles); cladding elements, one 890 mm x 1200 mm tile with two spans (three horizontal supports) of 540 mm, and one 890 mm x 600 mm tile simply supported, 480 mm span; two brackets for each vertical profile. Used adhesive system SikaTack® Panel-50 with adhesive bead of 12 mm x 3 mm (width x thickness) on horizontal profiles (applied vertically and discontinuously along the horizontal profile length, maximum distance between adhesive beads and minimum number of these for each cladding element) which is: in the case of cladding elements with one span 9 beads x 70 mm length on each horizontal profile; in the case of cladding element with 2 span 7 beads x 70 mm length on each external profile and 22 beads x 70 mm length on central profile. Characteristics of components are indicated in Annexes 2 and 3.

Table 3.2: Test results and calculated values for tested specimen.

(3) Wind suction test is stopped at 4000 Pa due to machine limitation. At the end of the test, the specimen remains intact and no deterioration or breakage is observed.

(4) Maximum displacement measured on the centre of the 1500 mm x 600 mm tile. On adhesive bead.

(5) Maximum deformation measured on the centre of right vertical border of the 750 mm x 600 mm tile. On adhesive bead.

(6) Maximum displacement and deformation measured on the centre of the 890 mm x 1200 mm tile. On adhesive beads.

(7) Calculated load for testing specimen configuration according to Annex F of EAD 090097-00-0404, without safety coefficient, as well as considering a vertical and horizontal profiles deflection L/200 using simple beam formulas.

(8) Limit value given on glued connections using design tensile stress value.

(9) Limit value given on the intermediate profile glued connection using design tensile stress value.

3.2 Initial mechanical resistance of the glued connection

Initial mechanical resistance has been tested according to clause 2.2.5.1 of EAD 090097-00-0404.

Test results for tensile strength at normal temperature are given in table 3.3.

Shear stress and shear displacement at normal temperature has not been assessed.

Table 3.3: SikaTack® Panel-50 mechanical resistance.

Test type		**Breaking tensile stress (MPa)**		**Elongation at break (%)**		**Ratio**	**Cohesive rupture (%)**
		$\sigma_{u,m}$	$\sigma_{u,c}$	$\varepsilon_{u,m}$	$\varepsilon_{u,c}$	Δx_m	$C_{r,m}$
Initial	NT	1,55	1,45	283	224	---	100
Residual	HT	1,59	1,47	218	175	1,03	100
	LT	1,51	1,39	269	193	0,97	99
	HT+HR	1,25	0,97	240	188	0,81	96
	H_2O	1,39	1,31	261	193	0,90	98
	HR+NaCl	1,51	1,32	261	190	0,97	99
	HR+SO_2	1,45	1,00	253	117	0,94	97
	CTL	1,36	1,12	262	183	0,88	97
	CSL	1,42	1,24	250	184	0,91	94
	TR	1,06	0,95	255	137	0,68	98
	EMC	1,33	0,95	229	84	0,85	99

Where:

NT = At normal temperature, +18 ºC to +23 ºC.
HT = At high temperature, +80 ºC ± 1 ºC.
LT = At low temperature, -20 ºC ± 1 ºC.
HT+HR = 1004 ± 4 hours at high temperature, 60 ºC ± 2 ºC and high relative humidity, 85 ± 2 %.
H_2O = After immersion in water for 7 days at normal temperature.
HR+NaCl = After high humidity and NaCl atmosphere for 480 ± 2 hours.
HR+SO_2 = After high humidity and SO_2 atmosphere.
CTL = After cyclic tensile loads.
CSL = After cyclic shear loads.
TR = Tear Resistance.
EMC = Effects of materials in contact
m = Mean (average) value.
c = Characteristic value giving 75% confidence that 95% of the test results will be higher than this value.

3.3 Residual mechanical resistance of the glued connection

Residual mechanical resistance has been tested according to clause 2.2.5.2 of EAD 090097-00-0404.

Test results for the following characteristics are given in table 3.3.

- Tensile stress and elongation at high and low temperature.
- Tensile stress after ageing under temperature and high humidity.
- Tensile stress after immersion in water.
- Tensile stress after ageing under high humidity and NaCl atmosphere.
- Tensile stress after ageing under high humidity and SO_2 atmosphere.
- Tensile stress after cyclic tensile loads.
- Tensile stress after cyclic shear loads, see also clause 3.3.1.
- Tear resistance.

3.3.1 Tensile stress after cyclic shear loads

In addition to the values given in table 3.3, in the case of tensile stress after cyclic shear loads, the obtained value for the stabilization load is $S_{t,m}$ = 9,7%.

3.3.2 Shear creep and climatic ageing

Test results for shear creep and climatic ageing are given in table 3.4.

Table 3.4: SikaTack® Panel-50 shear creep results.

Test type		**Vertical displacement after 168 ± 4 h (mm)**		**Vertical displacement after 1004 ± 4 h (mm)**		**Stabilization of vertical displacement (mm)**	
		$d1_m$	**$d1_c$**	**$d2_m$**	**$d2_c$**	**Stv_m**	**Stv_c**
Shear creep and climatic ageing	HT+HR	0,85	1,19	1,21	1,60	0,36	0,52

Where:
HT+HR = 1004 ± 4 hours at high temperature (60 ºC ± 2 ºC) and high relative humidity (85 ± 2 %).
m = Mean (average) value.
c = Characteristic value giving 75% confidence that 95% of the test results will be lower than this value.

3.4 Resistance of profiles

The following characteristics of the profiles are given in Annex 3:

- Form and dimensions of the profiles sections.
- Inertia of the profiles sections.
- Minimum elastic limit of the profiles material.

3.5 Pull-out resistance of subframe fixings

Pull-out resistance of subframe fixings has been assessed according to EAD 090097-00-0404. Mean and characteristic values are given in table 3.5.

Tensile strength of subframe fixing at least meets the values given in table 3.5 for pull-out resistance.

Table 3.5: Pull-out resistance and shear strength of subframe screws.

Test specimen	Pull-out resistance (kN)		Shear strength (kN)	
	F_m	F_c	F_m	F_c
Profile: Thickness 2,0 mm, AW-6005 aluminium alloy Self-drilling screw: Ø6,3 mm, A2 stainless steel	2,2	1,8	2,2	2,0
Profile: Thickness 3,0 mm, AW-6005 aluminium alloy Self-drilling screw: Ø6,3 mm, A2 stainless steel	NA	NA	8,9	7,9
Profile: Thickness 2,0 mm, AW-6005 aluminium alloy Self-drilling screw Ø4,2 mm, A2 stainless steel	2,1	1,9	1,3	1,1
Profile: Thickness 2,0 mm, AW-6005 aluminium alloy Self-drilling screw Ø3,5 mm, A2 stainless steel	1,9	1,8	NA	NA
Profile: Thickness 2,0 mm, AW-6005 aluminium alloy Self-drilling screw Ø2,9 mm, A2 stainless steel	1,8	1,6	0,8	0,8

Where:

F_m = mean value; F_c = characteristic value with a 75% confidence that 95% of results will be higher than this value.

NA = Not assessed.

(*) Characteristic value calculated using the variable kn as a function of the number of test specimens according to EN 1990, table D1, Vx, unknown.

3.6 Shear load resistance of subframe fixings

Shear load resistance of subframe fixings has been assessed according to EAD 090097-00-0404. Mean and characteristic values are given in table 3.5.

3.7 Bracket resistance (vertical and horizontal load)

Bracket resistance (horizontal and vertical load) has been assessed according to EAD 090097-00-0404. Mean and characteristic values are given in tables 3.6a and 3.6b.

Table 3.6a: Bracket resistance to vertical load.

Bracket type (mm)		Resistance (N) at 1 mm of displacement (ii)		Resistance (N) at 3 mm of displacement (ii)		Resistance (N) at ΔL = 0,2%·L mm of permanent deflection (ii)		Ultimate resistance (N) (ii)	
		F_m	F_c (iii)	F_m	F_c (iii)	F_m	F_c (iii)	F_m	F_c (iii)
ES-ALU-L-A	57/100	1340	1170	3610	2990	630	270	11520	11020
	77/100	1280	950	2970	2630	560	480	10000	8910
	97/100	680	510	1850	1700	600	340	7110	6020
	119/100	530	310	1410	1220	750	500	5070	4660
	137/100	510	470	1450	1410	710	580	4400	3860
	157/100	Not assessed							

Table 3.6a: Bracket resistance to vertical load.

Bracket type (mm)		Resistance (N) at 1 mm of displacement (ii)		Resistance (N) at 3 mm of displacement (ii)		Resistance (N) at ΔL = 0,2%·L mm of permanent deflection (ii)		Ultimate resistance (N) (ii)	
		F_m	F_c (iii)	F_m	F_c (iii)	F_m	F_c (iii)	F_m	F_c (iii)
ES-ALU-L-E	97/200 (i)	4480	2840	9170	8470	4300	2220	18730	15760
	119/200								
	137/200 (i)	4560	2770	9200	7650	5260	3440	13350	11310
	157/200								
ES-ALU-A	177/100	1270	1110	2930	2480	2430	1660	10000 (iv)	10000 (iv)
	208/100	990	480	2050	1540	2050	630	7500 (iv)	7500 (iv)
	238/100 (i)	710	440	1650	1490	2720	1610	6450	5580
	267/100								
ES-INOX-A	238/100 (i)	770	560	1450	1270	1510	1220	2910	2770
	267/100								
ES-ALU-E	177/200	1980	1210	5460	4480	1890	1150	12500 (iv)	12500 (iv)
	208/200	2430	1650	5540	3640	3100	760	13330	8460
	238/200 (i)	2920	1620	5790	3140	7530	7120	20000	19360
	267/200								
ES-INOX-E	238/200 (i)	2870	1980	5770	4450	6180	3440	10020	8580
	267/200								

Where:

F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

(i) Bracket not tested. Minimum value from the tested brackets.

(ii) When the bracket includes the thermal bridge break piece (see Annex 3), these resistance values shall be reduced applying a reduction factor = 0,80.

(iii) Characteristic value calculated using the variable kn as a function of the number of test specimens according to EN 1990, table D1, Vx, unknown.

(iv) Value obtained when the manufacturer has requested to stop the test.

Table 3.6b: Bracket resistance to horizontal load.

Bracket type (mm)		Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
		F_m	F_c (iii)	F_m	F_c (iii)
ES-ALU-L-A ES-ALU-L-V	57/100	3500	3300	7940	7350
	77/100	5220	4370	9740	9100
	97/100	4370	3910	9230	8610
	119/100	4960	4080	9760	9040
	137/100	5370	4670	11700	11140
	157/100 (i)	3500	3300	7940	7350
ES-ALU-L-E	97/200 (i)	4430	3510	20130	18720
	119/200				

Table 3.6b: Bracket resistance to horizontal load.

Bracket type (mm)		Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
		F_m	F_c (iii)	F_m	F_c (iii)
ES-ALU-A ES-ALU-V	137/200 (i)				
	157/200	4600	3050	20750	18640
	177/100	10520	8230	20320	18610
	208/100	10480	8680	20050	18580
	238/100 (i)				
	267/100	18210	15620	18800	17030
ES-INOX-A	238/100 (ii)	11410	7460	18070	16050
	267/100 (ii)				
ES-ALU-E	177/200	12630	9860	24930	24020
	208/200	8490	4190	25410	23290
	238/200 (i)				
	267/200	24500	21760	25100	22330
ES-INOX-E	238/200 (ii)	16850	13150	23600	18000
	267/200 (ii)				

Where:

F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

(i) Bracket not tested. Minimum value from the tested brackets.

(ii) Bracket not tested. Values obtained from another weakest bracket.

(iii) Characteristic value calculated using the variable kn as a function of the number of test specimens according to EN 1990, table D1, Vx, unknown.

3.8 Resistance of supplementary mechanical cladding fixings

Resistance of supplementary cladding fixings (horizontal and vertical load) has been assessed according to clause 2.2.5.3 of EAD 090097-00-0404. Mean and characteristic values are given in tables 3.7a and 3.7b.

Table 3.7a: Supplementary mechanical cladding fixing resistance to vertical load.

Type of clip		Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
		F_m	F_c	F_m	F_c
GR-SOV-P	Clip length 8,4 mm	160	140	200	180
	Clip length 14,3 mm	190 (i)	150 (i)	230	210
GR-SOV-TA	Clip length 8,4 mm	240	220	290	270
	Clip length 14,3 mm	260 (i)	140 (i)	350	320
GR-SOV-46-P-DOUBLE (iii)	Clip length 15 mm	(ii)	(ii)	160	100
GR-SOV-100-P-DOUBLE					
GR-SOV-46-T-DOUBLE (iii)	Clip length 15 mm	(ii)	(ii)	475	425
GR-SOV-100-T-DOUBLE					
GR-SO-S-40-T	----	1835	1570	2015	1790
GR-SO-S-80-T	----				
GR-SO-SH-40/10-T (iii)	----				

Table 3.7a: Supplementary mechanical cladding fixing resistance to vertical load.

Type of clip		Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
		F_m	F_c	F_m	F_c
GR-SO-SH-80/10-T	----				
GR-SO-S-R45	Tongue at 45 º	330	260	320	235
GR-SO-S-R45-TSE	----	395	125	1110	875

Where:

F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

(*) Characteristic value calculated using the variable kn as a function of the number of test specimens according to EN 1990, table D1, Vx, unknown.

(i) The load has been obtained at 0,25 mm of irreversible deformation because the load at 1 mm pass of deformation the failure load.

(ii) This value has not been measured because of the excessive clip deflection before to reach 1 mm of permanent deflection.

(iii) Tested clips which give value to the other clips.

Table 3.7b: Supplementary mechanical cladding fixing resistance to horizontal load.

Type of clip	Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
	F_m	F_c	F_m	F_c
GR-SOV-P	400 (i)	340 (i)	470	450
GR-SOV-TA	170	150	500	430
GR-SOV-46-P-DOUBLE (ii)	235	180	455	425
GR-SOV-100-P-DOUBLE				
GR-SOV-46-T-DOUBLE (ii)	275	240	990	855
GR-SOV-100-T-DOUBLE				
GR-SO-S-40-T	Not relevant			
GR-SO-S-80-T				
GR-SO-SH-40/10-T				
GR-SO-SH-80/10-T				
GR-SO-S-R45				
GR-SO-S-R45-TSE				

Where:

F_m = mean values; F_c = characteristic values giving 75% confidence that 95% of results will be higher than this value.

(*) Characteristic value calculated using the variable kn as a function of the number of test specimens according to EN 1990, table D1, Vx, unknown.

(i) The load has been obtained at 0,25 mm of irreversible deformation because the load at 1 mm of deformation pass the failure load.

(ii) Tested clips which give value to the other clips.

3.9 Behaviour after immersion in water

Behaviour after immersion in water of the PF-SOV kit has been assessed according to clause 2.2.6.2 of EAD 090097-00-0404.

Tensile stress after immersion in water of glued connection is given in table 3.3.

3.10 Linear thermal expansion

Linear thermal expansion of the metallic subframe components has been assessed according to EAD 090097-00-0404.

Linear thermal expansion values are given in Annex 3.

3.11 Corrosion

Corrosion of PF-ALT-SOV kit components has been assessed according to clause 2.2.6.4 of EAD 090097-00-0404.

Regarding the glued connection, tensile stress after ageing under high humidity and NaCl atmosphere and after ageing under high humidity and SO_2 atmosphere are given in table 3.3.

Regarding the metallic kit components:

- Profiles and brackets are made of aluminium alloy AW 6005 T6 according to EN 573, EN 1999 and EN 755. The durability is class B and the minimum thickness is 1,5 mm. Therefore, these components may be used in the following external atmospheric exposure: rural environment, moderate industrial/urban environment, but excluding industrial marine environment. These components may be used in other external atmospheric conditions exposure if the components are protected as indicated in EN 1999-1-1.
- Subframe drilling screws are made of stainless steel, quality A2 or A4 according to EN ISO 3506. The supplementary cladding fixings are made of stainless steel 1.4301 or 1.4404 according to EN 10088. Therefore these components may be used in dry internal conditions or exposure in permanent damp internal conditions and also in external atmospheric exposure with high category of corrosivity of the atmosphere (including industrial and marine environment, C4 as defined in ISO 9223), if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent or alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing materials are used).

In addition, special attention should be considered in order to prevent the possible galvanic corrosion.

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

According to the decision 2003/640/EC, as amended of the European Commission[2], the systems of AVCP (see EC delegated regulation (EU) No 568/2014 amending Annex V to Regulation (EU) 305/2011) given in the following table apply.

Table 4.1: Applicable AVPC system.

Product	Intended use	Level or class	System
Kits for external wall claddings glued to the subframe	External finishes of walls	Any	2+
	For uses subject to regulations on reaction to fire	A1 (*), A2 (*), B (*), C (*)	1
		A1 (**), A2 (**), B (**), C (**), D, E, F (**)	3
		A1 to F (***)	4

(*) Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction-to-fire classification (e.g. an addition of fire retardants or a limiting of organic material).

(**) Products/materials not covered by footnote (*).

(***) Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of classes A1 according to Commission Decision 96/603/EC, as amended).

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

All the necessary technical details for the implementation of the AVCP system are laid down in the *Control Plan* deposited with the ITeC[3], with which the factory production control shall be in accordance.

Issued in Barcelona on 19 April 2021

by the Catalonia Institute of Construction Technology.

Ferran Bermejo Nualart

Technical Director, ITeC

[2] 2003/640/EC – Commission Decision of date 4 September 2003, published in the Official Journal of the European Union (OJEU) L226/21 of 10/09/2003.

[3] The *Control Plan* is a confidential part of the ETA and is only handed over to the notified certification body involved in the assessment and verification of constancy of performance.

ANNEX 1: PF-ALT-SOV assembled system

Figure A1.1: PF-ALT-SO assembled system.

Figure A1.2: PF-ALT-SV assembled system.

Figure A1.3: PF-AL-TH/SOV assembled system.

ANNEX 2: Adhesive system

Information included in tables A2.1 to A2.4 has been taken from the technical data sheets of the adhesive system supplier (Sika Services AG). SikaTack® Panel-50 kit is covered by the ETA 19/0511.

Table A2.1: SikaTack® Panel-50 Adhesive.

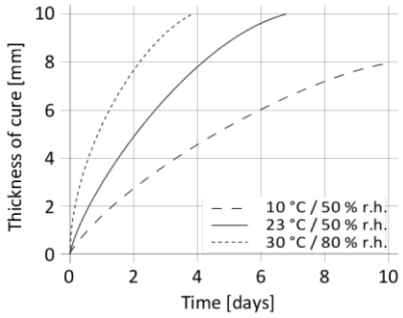
Typical Product Data	**Reference**	**Value**
Chemical base	---	1-component silicone
Colour	CQP 001-1	Grey
Cure mechanism	---	Moisture-curing
Density (uncured)	---	1,4 kg/l
Non-sag properties	CQP 061-4 / ISO 7390	Good
Application temperature ambient	---	5 ºC to 40 ºC
Skin time at 23 ºC / 50% RH	CQP 019-1	25 min.
Curing speed	CQP 049-1	
Tensile strength	CQP 036-1 / ISO 527	2,1 MPa
Elongation at break	CQP 036-1 / ISO 527	450%
Tear propagation resistance	CQP 045-1 / ISO 34	7 N/mm
Service temperature	---	- 40 ºC to 150 ºC
Shelf life storage below 25 ºC	CQP 016-1	9 months
Shrinkage	EN ISO 10563	Change in mass: Δm = - 2,7% (*) Change in volume ΔV = - 4,1% (*)
Effects of materials in contact	Clause 3.4.2.3 of EAD 090097-00-0404	See table 3.3 No decolouration has been observed
Specific mass	EN ISO 1183-1, method B	1,35 kg/l
Tensile elastic modulus	EN ISO 527-3	2,65 MPa
Flow resistance	EN ISO 7390, method A	No flow
Hardness Shore A	EN ISO 868	41,4
	CQP 023-1 / ISO 7619-1	38
Thermogravimetric analysis	EN ISO 11358-1	Curve kept in ETA 19/0511 technical dossier
Colour	EN ISO 11664-4	Grey
CQP = Corporate Quality Procedure. (*) The symbol "-" indicates a decrease of mass or volume.		

Table A2.2: SikaTack® Panel-Primer.

Typical Product Data	Reference	Value
Chemical base	---	Solvent-based Epoxy solution
Colour	CQP 001-1	Black
Solid content	---	32%
Application temperature	---	5 ºC to 40 ºC
Application method	---	Brush, felt or foam applicator
Consumption	---	50 ml/m^2 approx. (*)
Flash-off time	---	10 min. (≥ 15 ºC) 30 min. (< 15 ºC) 8 hours (maximum)
Shelf life storage below 25 ºC, sealed container in dry place	CQP 016-1	9 months
CQP = Corporate Quality Procedure. (*) Depending on the porosity surface of the cladding element or subframe profile.		

Table A2.3: Sika® Aktivator-205.

Typical Product Data	Reference	Value
Chemical base	---	Solvent-based adhesion promoter
Colour	---	Colourless, clear
Application temperature	---	5 ºC to 40 ºC
Application method	---	Wiping with lint-free paper towel
Consumption	---	20 ml/m^2 approx. (*)
Flash-off time at 23 ºC / 50% RH (**)	---	Minimum: 10 min. Maximum: 2 hours
Shelf life storage below 25 ºC, sealed container in dry place	---	12 months
CQP = Corporate Quality Procedure. (*) Depending on porosity surface of the cladding element or subframe profile. (**) In specific applications, temperature and flash-off time may be different.		

Table A2.4: SikaTack® Panel-Tape.

Typical Product Data	Reference	Value
Chemical base	---	Closed cell polyethylene foam core with pressure sensitive adhesive
Colour	---	Anthracite
Section dimension	---	3 mm x 12 mm
Density	---	0,064 g/cm^3
Tensile strength	ISO 527	MD: 25 N/15 mm TD: 20 N/15 mm
Elongation at break	ISO 527	MD: 250% TD: 150%
Compressive strength	ISO 844	0,02 N/mm^2 (10% deflection) 0,05 N/mm^2 (25% deflection) 0,12 N/mm^2 (50% deflection)
Peel adhesion	FTM 1	23 N/25 mm (180º, 30 min., stainless steel)
Resistance to shear	FTM 8	150 h (1 kg / 25 mm x 25 mm)
Application temperature	---	5 ºC to 35 º C
Service temperature	---	- 40 ºC to 70 ºC
Shelf life storage below 25 ºC, dry and sunlight protected	---	24 months
FTM = FINAL Test Method. MD = Longitudinal direction. TD = Transversal direction.		

ANNEX 3: Subframe components

A3.1 Supplementary mechanical cladding fixings

Table A3.1: Geometric and material properties of the clips.

Geometry characteristics			
Form and dimensions (mm)	GR-SOV-P	Variable length between 5 and 19 mm	See figure A3.1.1
	GR-SOV-TA (left)		See figure A3.1.2
	GR-SOV-TA (right)		See figure A3.1.3
	GR-SOV-100-P-DOUBLE	Variable length between 9 and 15 mm	See figure A3.1.4
	GR-SOV-100-T-DOUBLE		See figure A3.1.5
	GR-SOV-46-P-DOUBLE (left)		See figure A3.1.6
	GR-SOV-46-P-DOUBLE (right)		See figure A3.1.7
	GR-SOV-46-T-DOUBLE (left)		See figure A3.1.8
	GR-SOV-46-T-DOUBLE (right)		See figure A3.1.9
	GR-SO-S-40-T	----	See figure A3.1.10
	GR-SO-S-80-T		See figure A3.1.11
	GR-SO-SH-40/10-T		See figure A3.1.12
	GR-SO-SH-80/10-T		See figure A3.1.13
	GR-SO-S-R45		See figure A3.1.14
	GR-SO-S-R45-TSE (left)		See figure A3.1.15
	GR-SO-S-R45-TSE (right)		See figure A3.1.16

Material properties		**Value**	**Reference**
Clips	Material	Stainless steel 1.4301 (X5CrNi18-10) or 1.4404 (X2CrNiMo17-12-2)	EN 10088-2
	Resistance to corrosion	Pass	
	Specific weight (kg/m^3)	7900	
	Elastic limit (MPa)	≥ 230	
	Tensile strength (MPa)	540 a 750	
	Elongation (%)	≥ 45	
	Modulus of elasticity at 20 ºC (GPa)	200	
	Modulus of transversal elasticity, G (MPa)	27000	
	Poisson coefficient	0,3	
	Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	16,0	

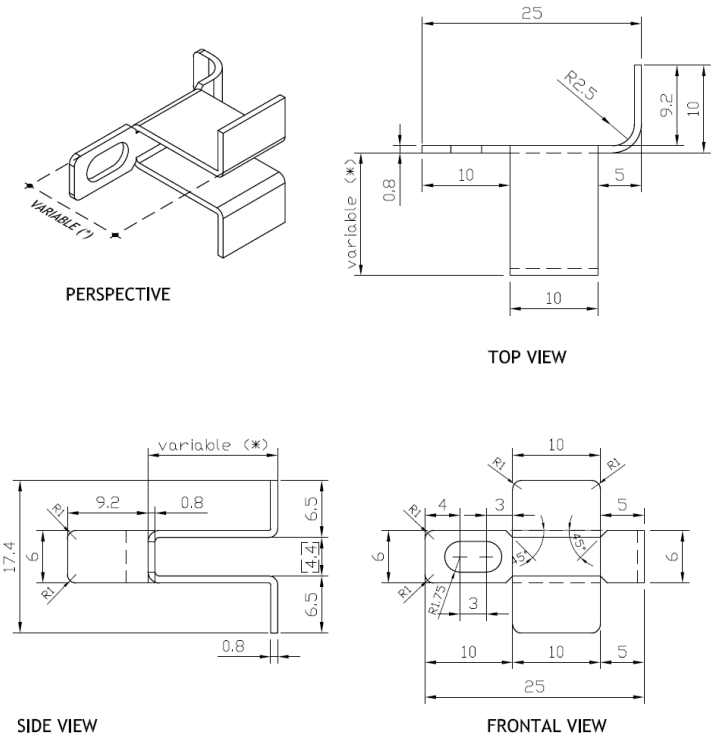


Figure A3.1.1: Clip GR-SOV-P.

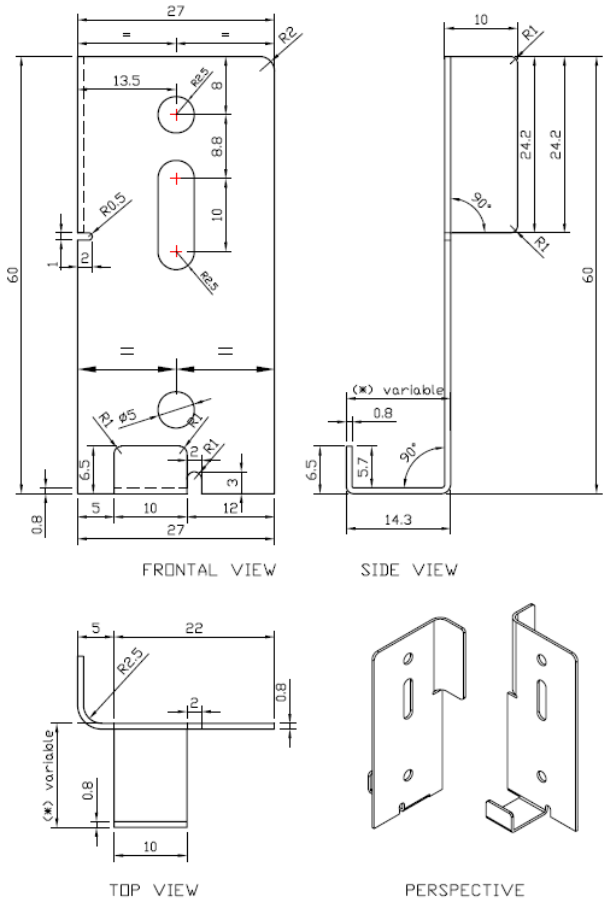


Figure A3.1.2 Clip GR-SOV-TA (left).

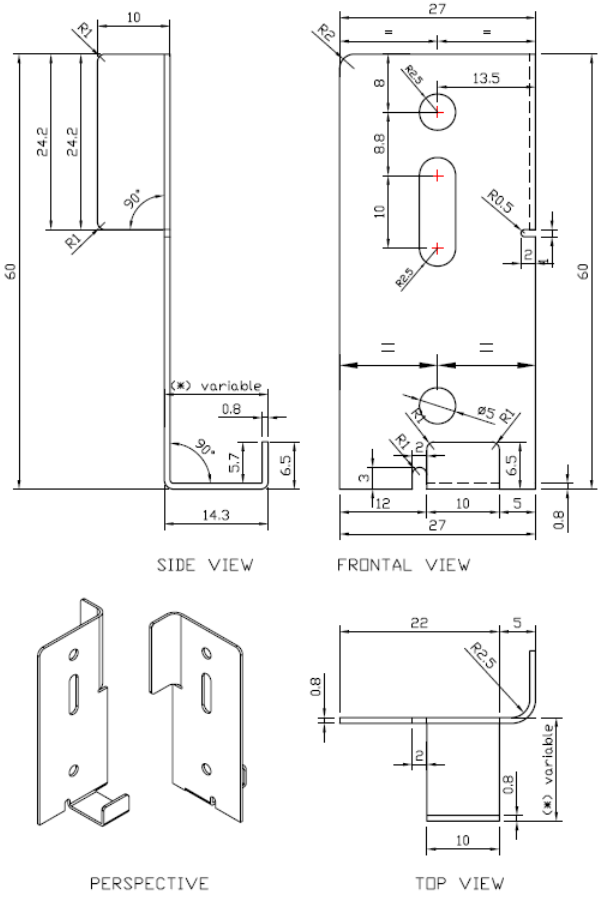


Figure A3.1.3: Clip GR-SOV-TA (right).

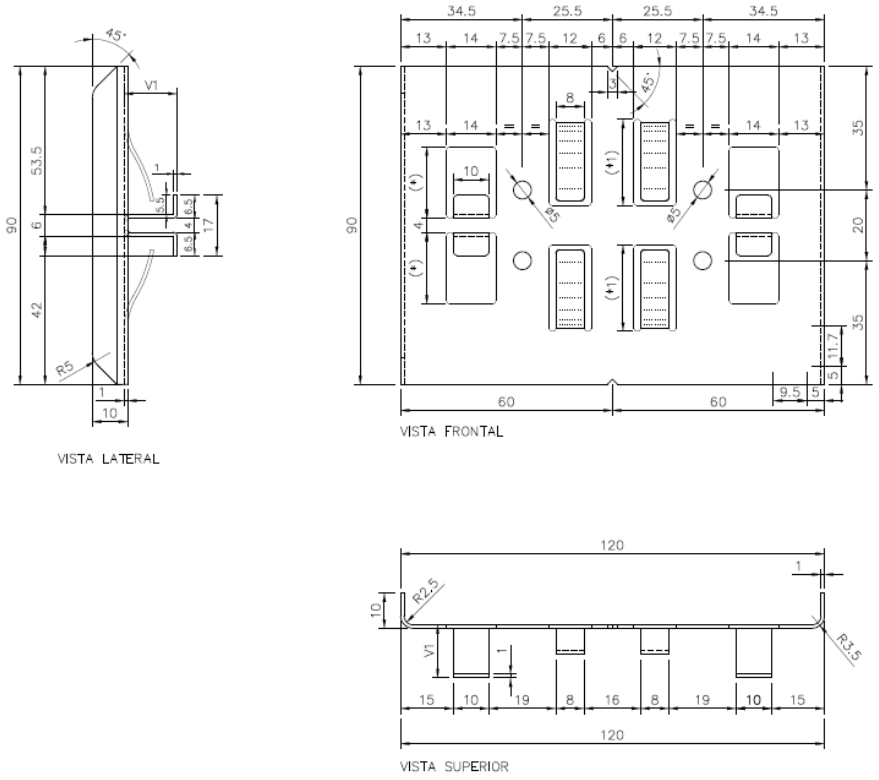


Figure A3.1.4: Clip GR-SOV-100-P-DOUBLE.

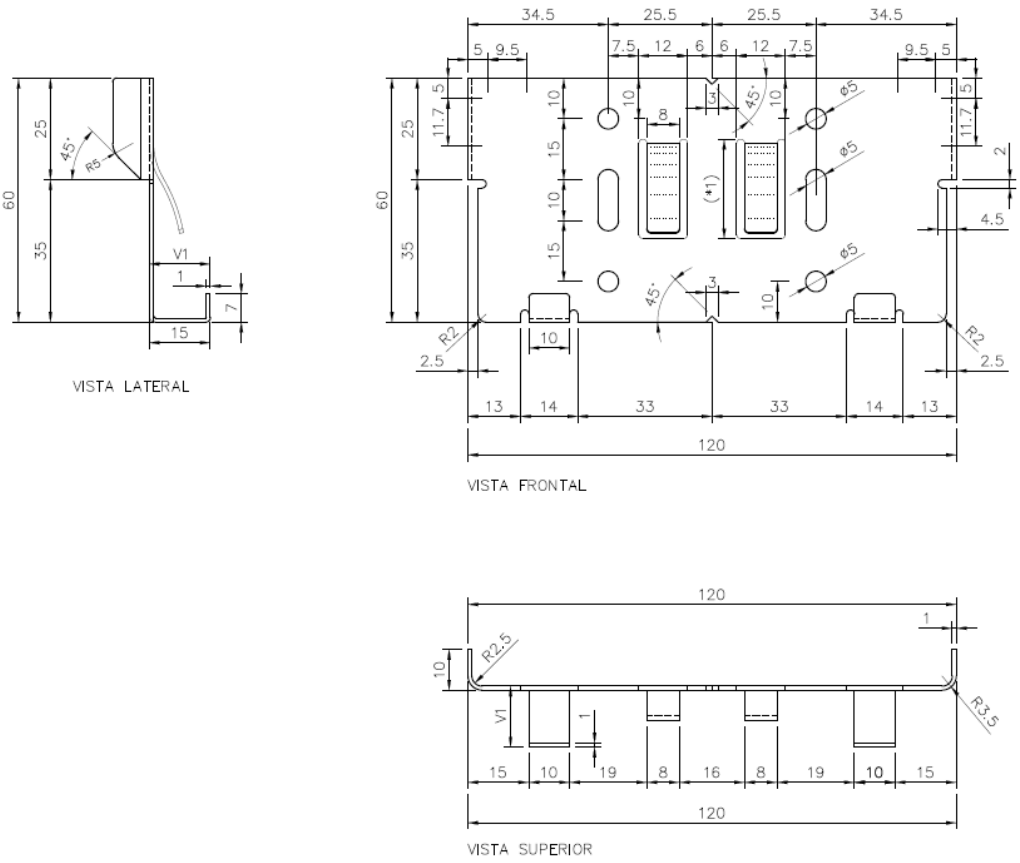


Figure A3.1.5: Clip GR-SOV-100-T-DOUBLE.

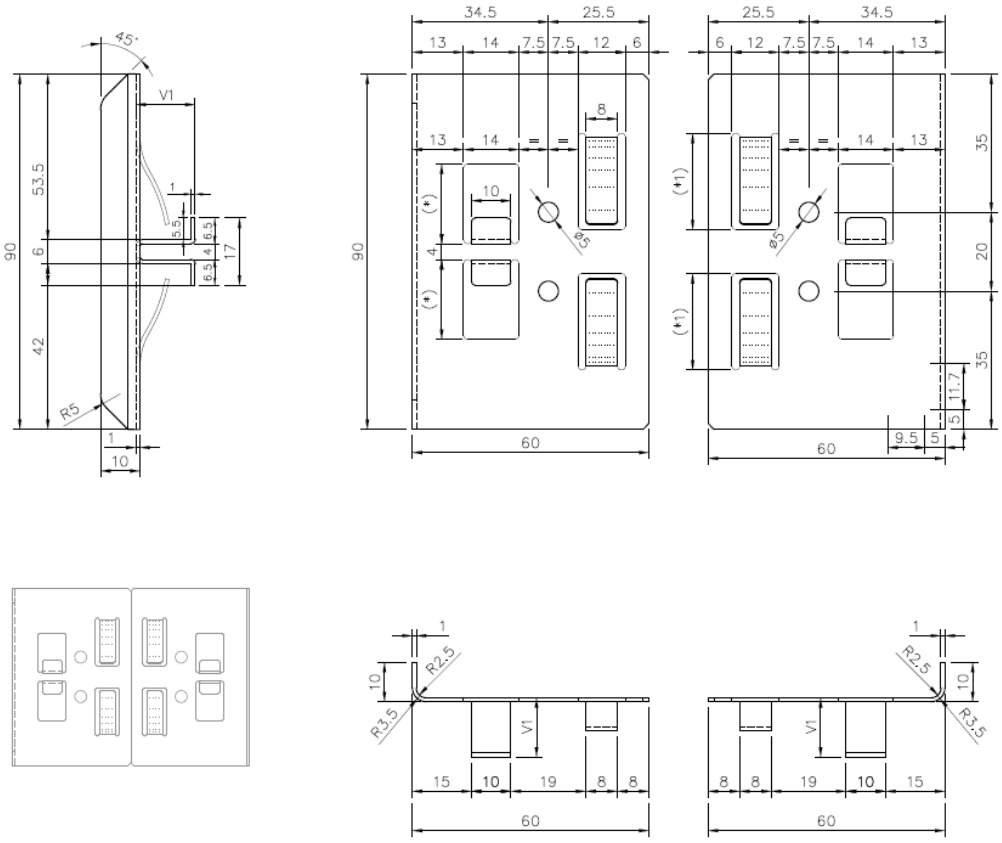


Figure A3.1.6: Clip GR-SOV-46-P-DOUBLE (left).

Figure A3.1.7: Clip GR-SOV-46-P-DOUBLE (right).

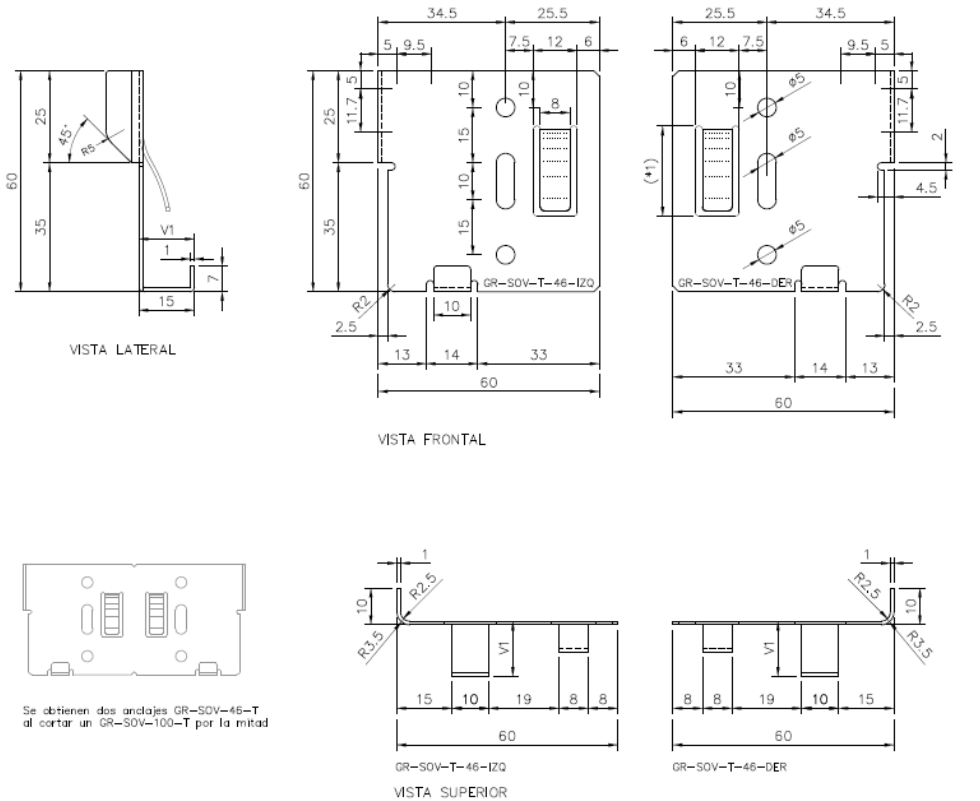


Figure A3.1.8: Clip GR-SOV-46-T-DOUBLE (left).

Figure A3.1.9: Clip GR-SOV-46-T-DOUBLE (right).

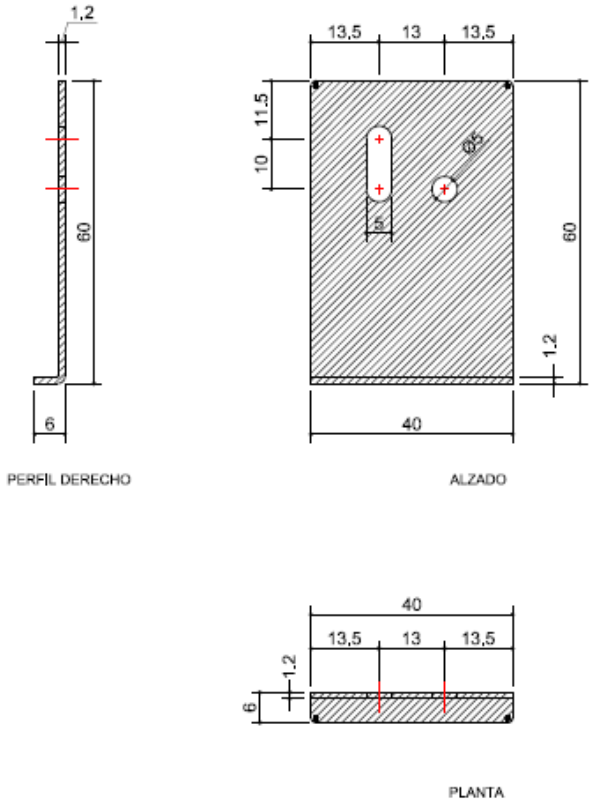


Figure A3.1.10: Clip GR-SO-S-40-T.

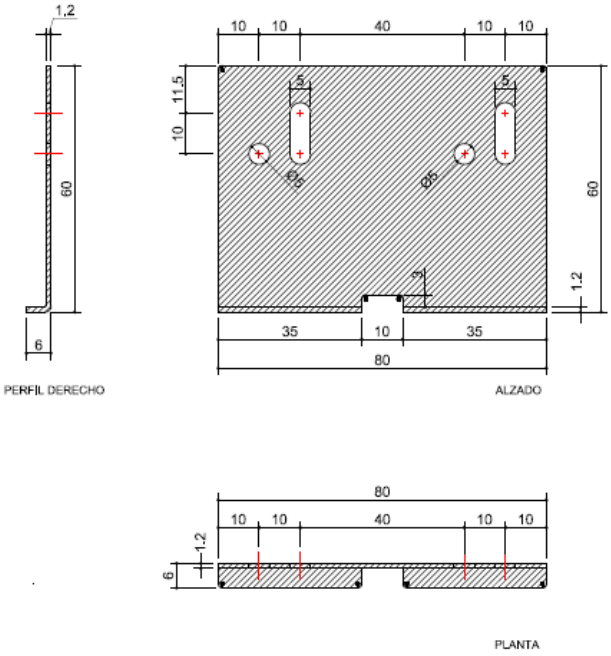


Figure A3.1.11: Clip GR-SO-S-80-T.

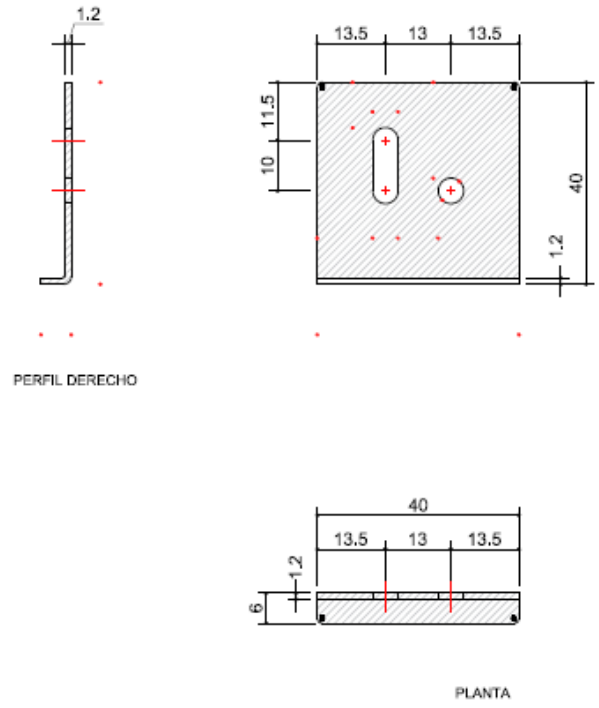


Figure A3.1.12: Clip GR-SO-SH-40/10-T.

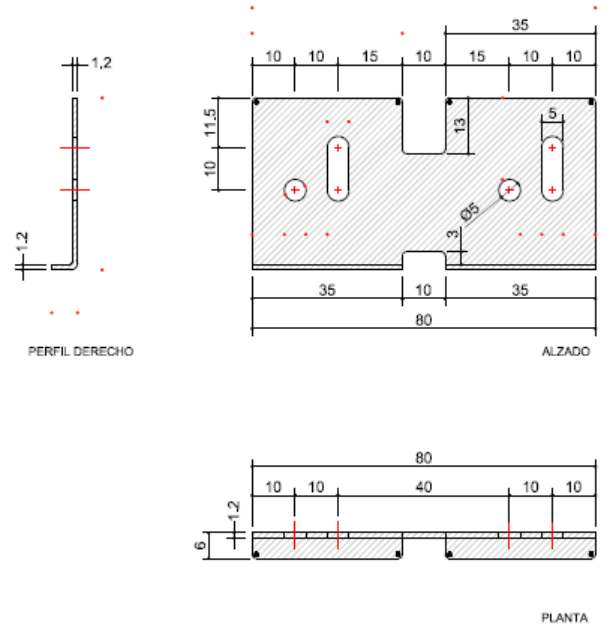


Figure A3.1.13: Clip GR-SO-SH-80/10-T.

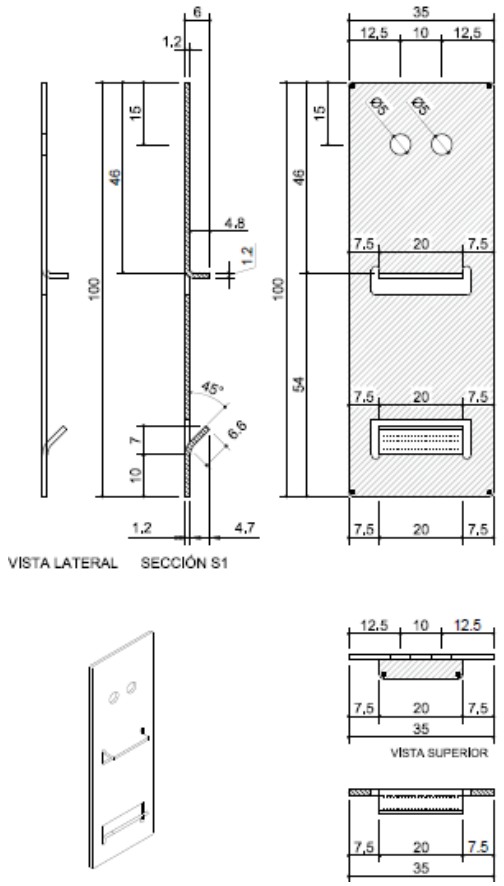


Figure A3.1.14: Clip GR-SO-S-R45.

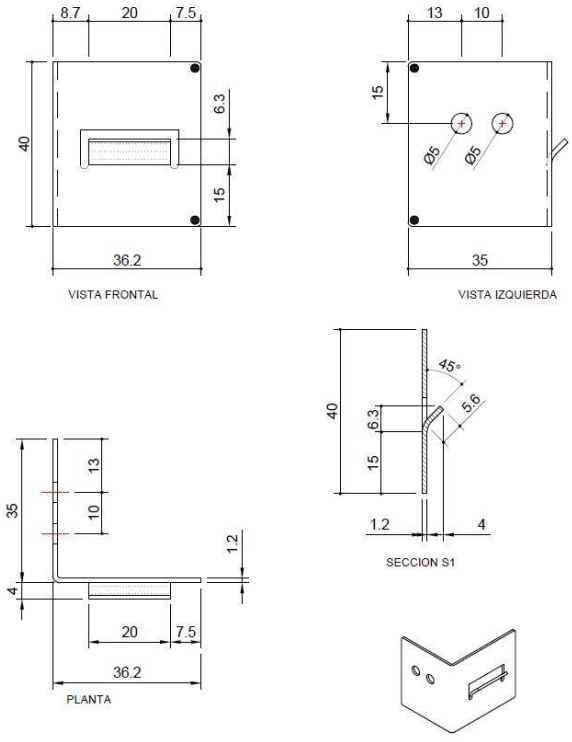


Figure A3.1.15: Clip GR-SO-S-R45-TSE (left).

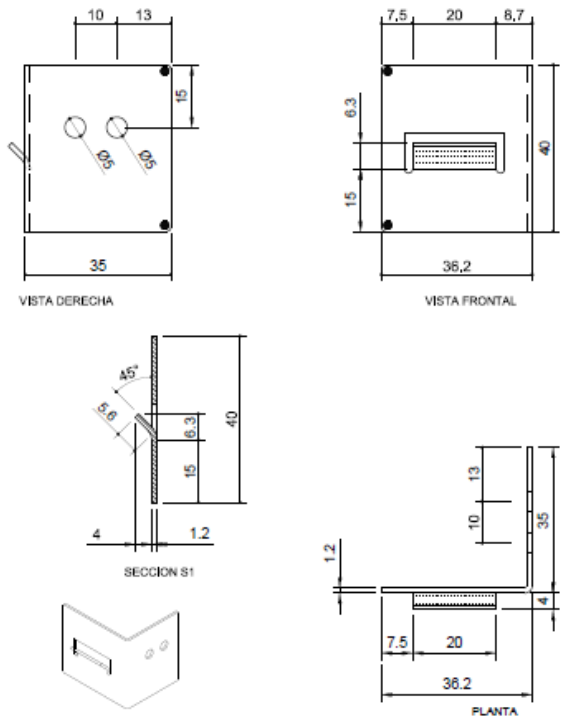


Figure A3.1.16: Clip GR-SO-S-R45-TSE (right).

A3.2 Subframe profiles

A3.2.1 Vertical profile configuration (PF-ALT-SO and PF-ALT-SV)

Table A3.2.1: Vertical profiles geometric and material properties.

Geometric properties							
Type of profile		**Form and dimensions (mm)**		**Weight per linear metre (kg/m)**	**Cross section (mm^2)**	**Inertia of profile section (cm^4)**	
						I_{xx}	**I_{yy}**
PF-AL-T	100 x 70 x 2,0	Figure A3.2.1	dy = 15,6	1,09	450,05	17,60	29,30
PF-AL-L	45 x 70 x 2,0	Figure A3.2.2	dy = 22,1	0,71	262,50	14,30	6,70
PF-AL-J	45 x 70 x 1,5	Figure A3.2.3	dy = 35,2	1,05	387,63	25,30	12,00
PF-AL-JT	45 x 90 x 1,5	Figure A3.2.4	dy = 44,6	1,30	483,13	54,09	15,41
PF-AL-T-35mm	100 x 35 x 2,0	Figure A3.2.5	dy = 11,2	1,23	456,23	6,38	36,00
PF-AL-TT	100 x 90 x 1,5	Figure A3.2.6	dy = 37,1	1,97	729,49	86,03	41,85

Material properties		
Characteristic	**Value**	**Reference**
Material	EN AW-6005	EN 755 EN 1999-1
Treatment	T6	
Durability class	B	
Specific weight (kg/m^3)	2700	
Elastic limit (MPa)	225	
Elongation (%)	8	
Tensile strength (MPa)	270	
Modulus of elasticity (MPa)	70000	
Poisson coefficient	0,3	
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	23,0	

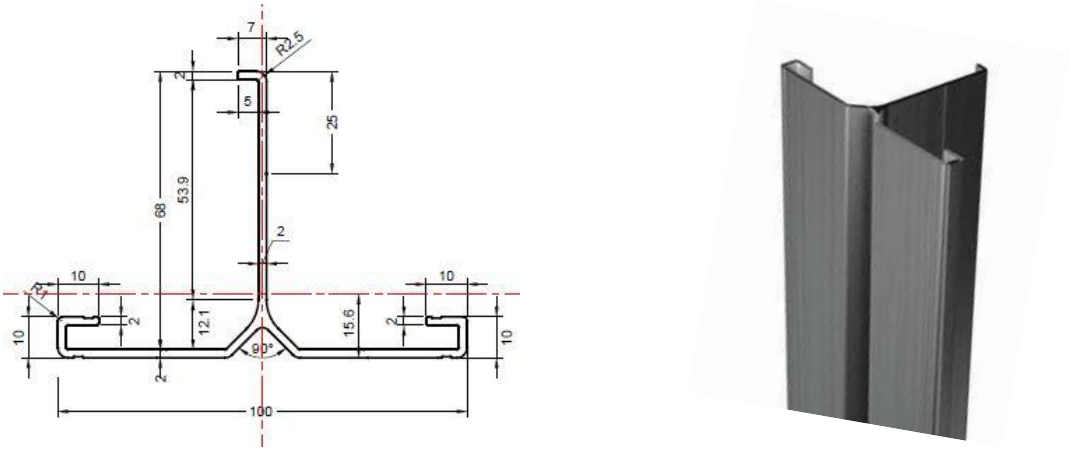


Figure A3.2.1: Profile PF-AL-T.

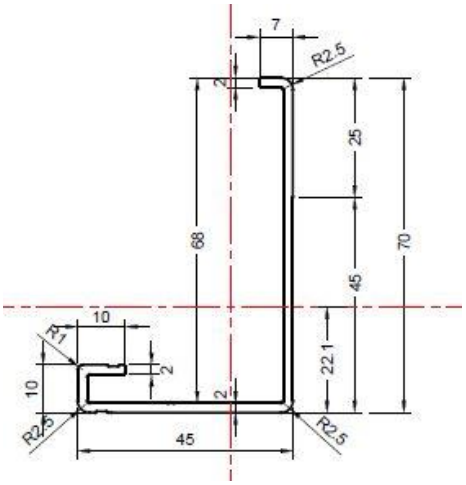


Figure A3.2.2: Profile PF-AL-L.

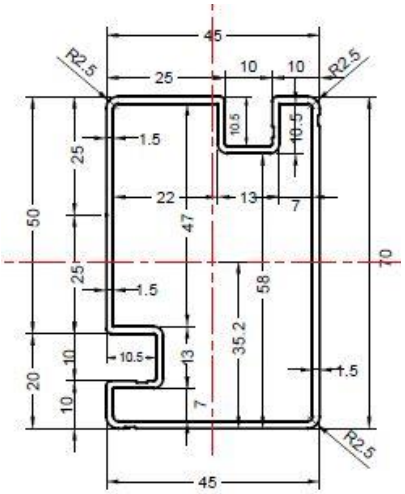


Figure A3.2.3: Profile PF-AL-J.

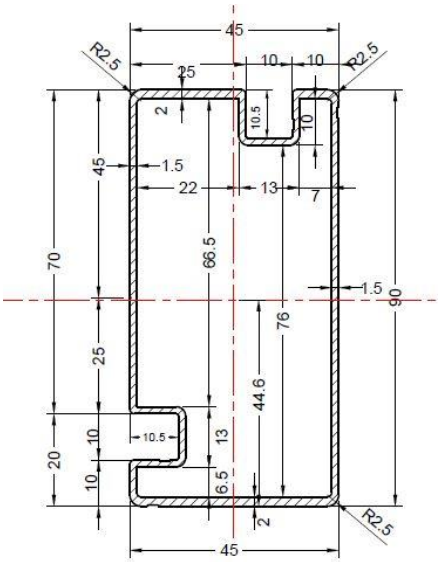


Figure A3.2.4: Profile PF-AL-JT.

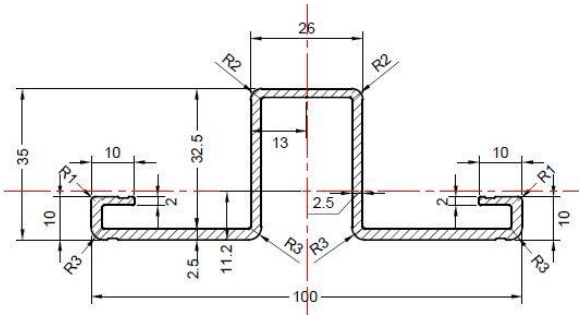


Figure A3.2.5: Profile PF-AL-T-35mm.

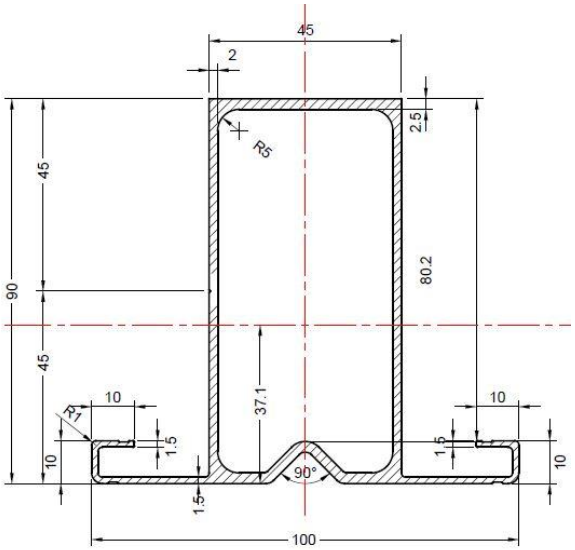


Figure A3.2.6: Profile PF-AL-TT.

A3.2.2 Horizontal profile configuration (PF-AL-TH/SOV)

Horizontal profiles

Table A3.2.2: Geometric and material properties of the horizontal profile.

Geometric properties						
Type of profile		**Form and dimensions (mm)**	**Weight per linear metre (kg/m)**	**Cross section (mm^2)**	**Inertia of profile section (cm^4)**	
					I_{xx}	**I_{yy}**
PF-AL-TH-P	35 x 120 x 1,5	Figure A3.2.7	1,28	475,07	44,18	10,39
PF-AL-TH-T	35 x 60 1,5	Figure A3.2.8	1,14	422,88	15,68	6,16
Material properties						
Characteristic			**Value**		**Reference**	
Material			EN AW-6005		EN 755 EN 1999-1	
Treatment			T6			
Durability class			B			
Specific weight (kg/m^3)			2700			
Elastic limit (MPa)			225			
Elongation (%)			8			
Tensile strength (MPa)			270			
Modulus of elasticity (MPa)			70000			
Poisson coefficient			0,3			
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))			23,0			

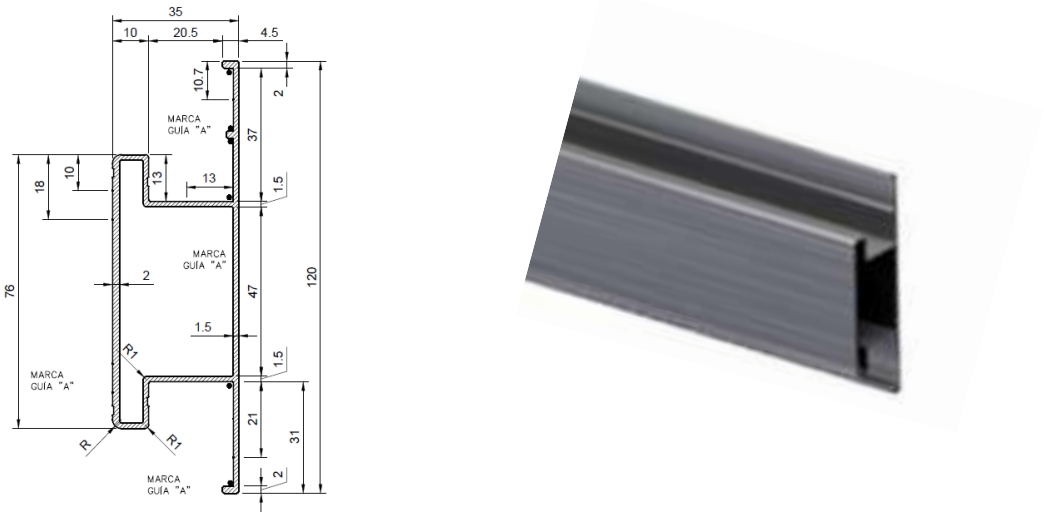
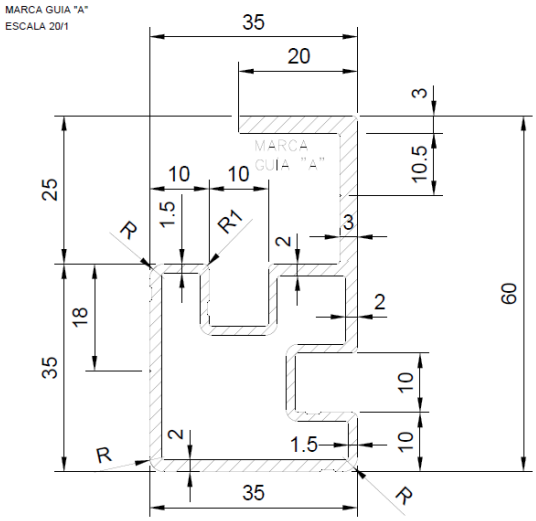


Figure A3.2.7: Profile PF-AL-TH-P.



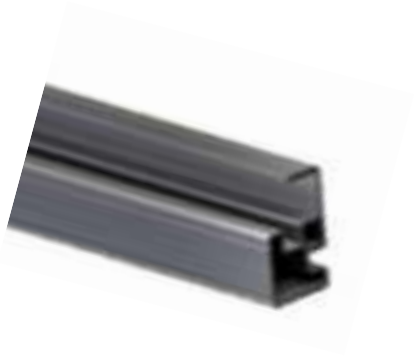


Figure A3.2.8: Profile PF-AL-TH-T.

Vertical profiles

Vertical profiles used for horizontal profile configuration are indicated in clause A3.2.1.

A3.3 Brackets

A3.3.1 Vertical profile configuration (PF-ALT-SO and PF-ALT-SV)

A3.3.1.1 Aluminium brackets

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties				
Type of bracket (H x L x B x t1 x t2)			**Form and dimensions (mm)**	**Trade name**
ES-ALU-L-A  Height = 100 mm	100 x L x 50 x 3,5 x 3,5	L = 57	Figure A3.3.1	ES-ALU-L-57/100-A
	100 x L x 50 x 4,0 x 4,0	L = 77		ES-ALU-L-77/100-A
		L = 97		ES-ALU-L-97/100-A
		L = 119		ES-ALU-L-119/100-A
	100 x L x 50 x 4,5 x 4,5	L = 137		ES-ALU-L-137/100-A
	100 x L x 50 x 4,5 x 5,0	L = 157		ES-ALU-L-157/100-A
ES-ALU-L-V  Height = 100 mm	100 x L x 50 x 3,5 x 3,5	L = 57	Figure A3.3.2	ES-ALU-L-57/100-V
	100 x L x 50 x 4,0 x 4,0	L = 77		ES-ALU-L-77/100-V
		L = 97		ES-ALU-L-97/100-V
		L = 119		ES-ALU-L-119/100-V
	100 x L x 50 x 4,5 x 4,5	L = 137		ES-ALU-L-137/100-V
	100 x L x 50 x 4,5 x 5,0	L = 157		ES-ALU-L-157/100-V
ES-ALU-L-E  Height = 200 mm	200 x L x 50 x 4,0 x 4,0	L = 97	Figure A3.3.3	ES-ALU-L-97/200-E
		L = 119		ES-ALU-L-119/200-E
	200 x L x 50 x 4,5 x 4,5	L = 137		ES-ALU-L-137/200-E
	200 x L x 50 x 4,5 x 5,0	L = 157		ES-ALU-L-157/200-E
ES-ALU-A  Height = 100 mm	100 x L x 60 x 5,0 x 8,0	L = 177 L1 = 31	Figure A3.3.4	ES-ALU-177/100-A
		L = 208 L1 = 31		ES-ALU-208/100-A
	100 x L x 60 x 6,0 x 9,0	L = 238	Figure A3.3.5	ES-ALU-238/100-A
	100 x L x 60 x 6,0 x 10	L = 267	Figure A3.3.6	ES-ALU-267/100-A
ES-ALU-V  Height = 100 mm	100 x L x 60 x 5,0 x 8,0	L = 177 L1 = 31	Figure A3.3.7	ES-ALU-177/100-V
		L = 208 L1 = 31		ES-ALU-208/100-V
	100 x L x 60 x 6,0 x 9,0	L = 238	Figure A3.3.8	ES-ALU-238/100-V
	100 x L x 60 x 6,0 x 10	L = 267	Figure A3.3.9	ES-ALU-267/100-V

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties				
ES-ALU-E  Height = 200 mm	200 x L x 60 x 5,0 x 8,0	L = 177 L1 = 31	Figure A3.3.10	ES-ALU-177/200-E
		L = 208 L1 = 31		ES-ALU-208/200-E
	200 x L x 60 x 6,0 x 9,0	L = 238	Figure A3.3.11	ES-ALU-238/200-E
	200 x L x 60 x 6,0 x 10	L = 267	Figure A3.3.12	ES-ALU-267/200-E

Material properties		
Characteristic	**Value**	**Reference**
Material	EN AW-6005	EN 755 EN 1999-1
Treatment	T6	
Durability class	B	
Specific weight (kg/m^3)	2700	
Elastic limit (MPa)	225	
Elongation (%)	8	
Tensile strength (MPa)	270	
Modulus of elasticity (MPa)	70000	
Poisson coefficient	0,3	
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	23,0	

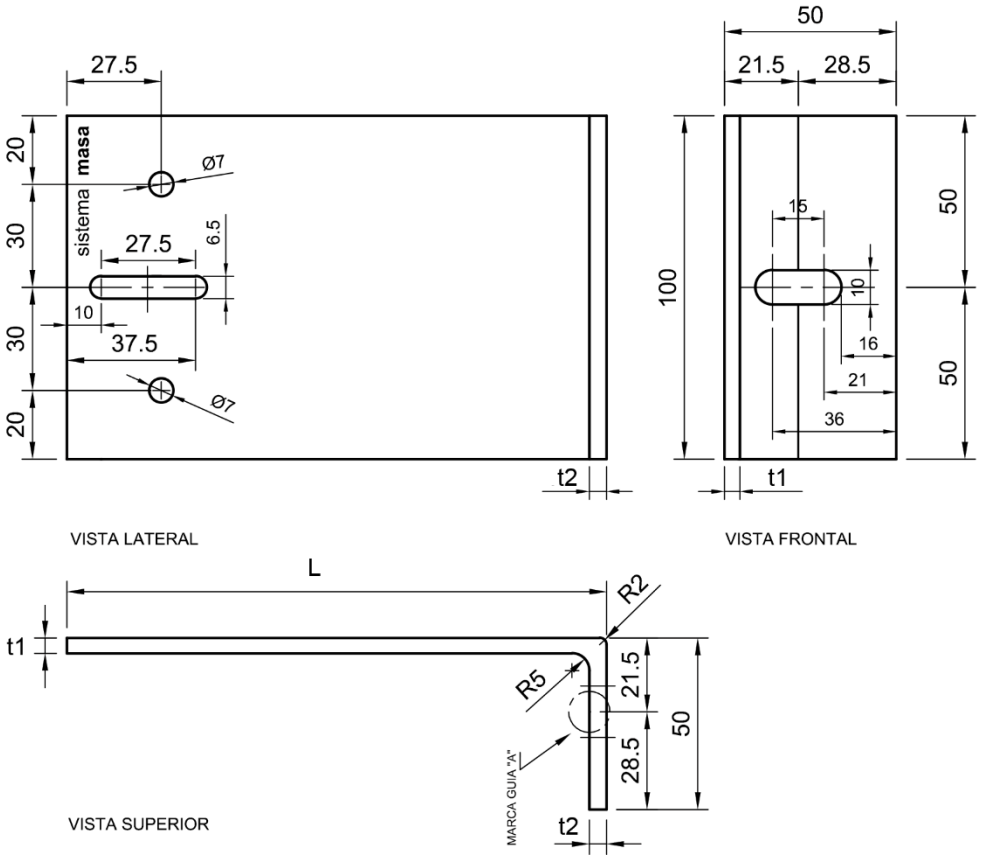


Figure A3.3.1: Brackets ES-ALU-L-A.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

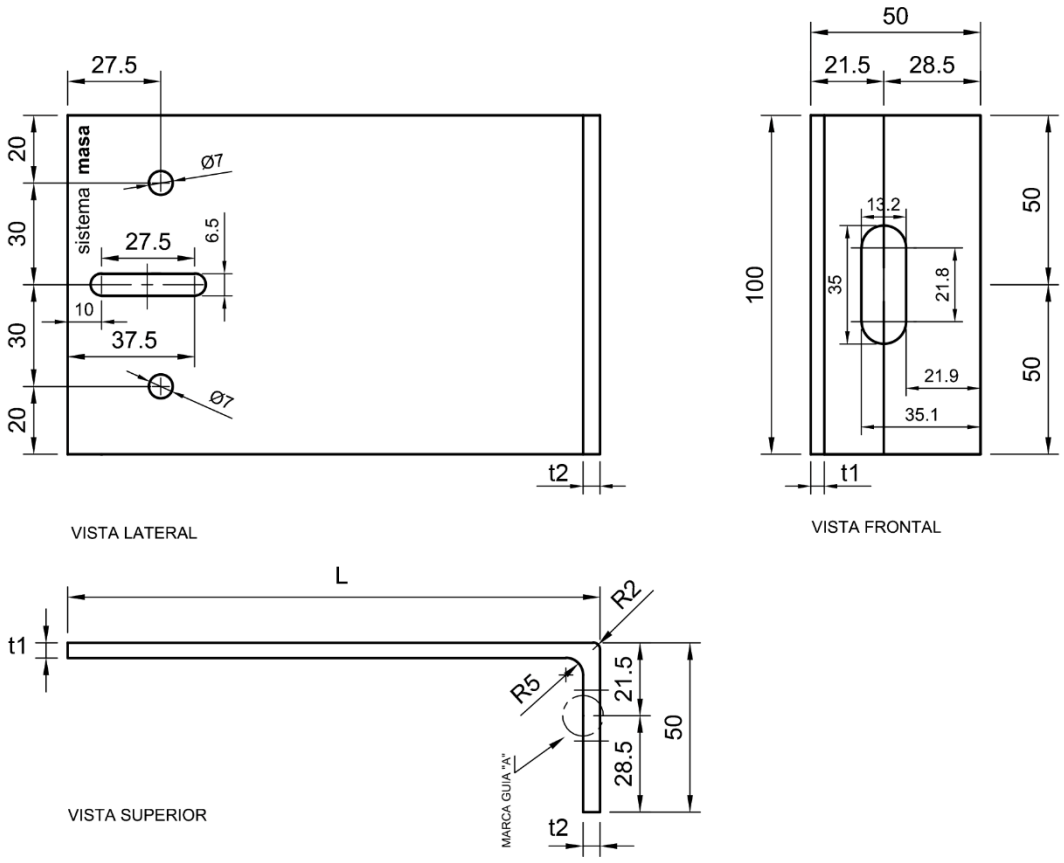


Figure A3.3.2: Brackets ES-ALU-L-V.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

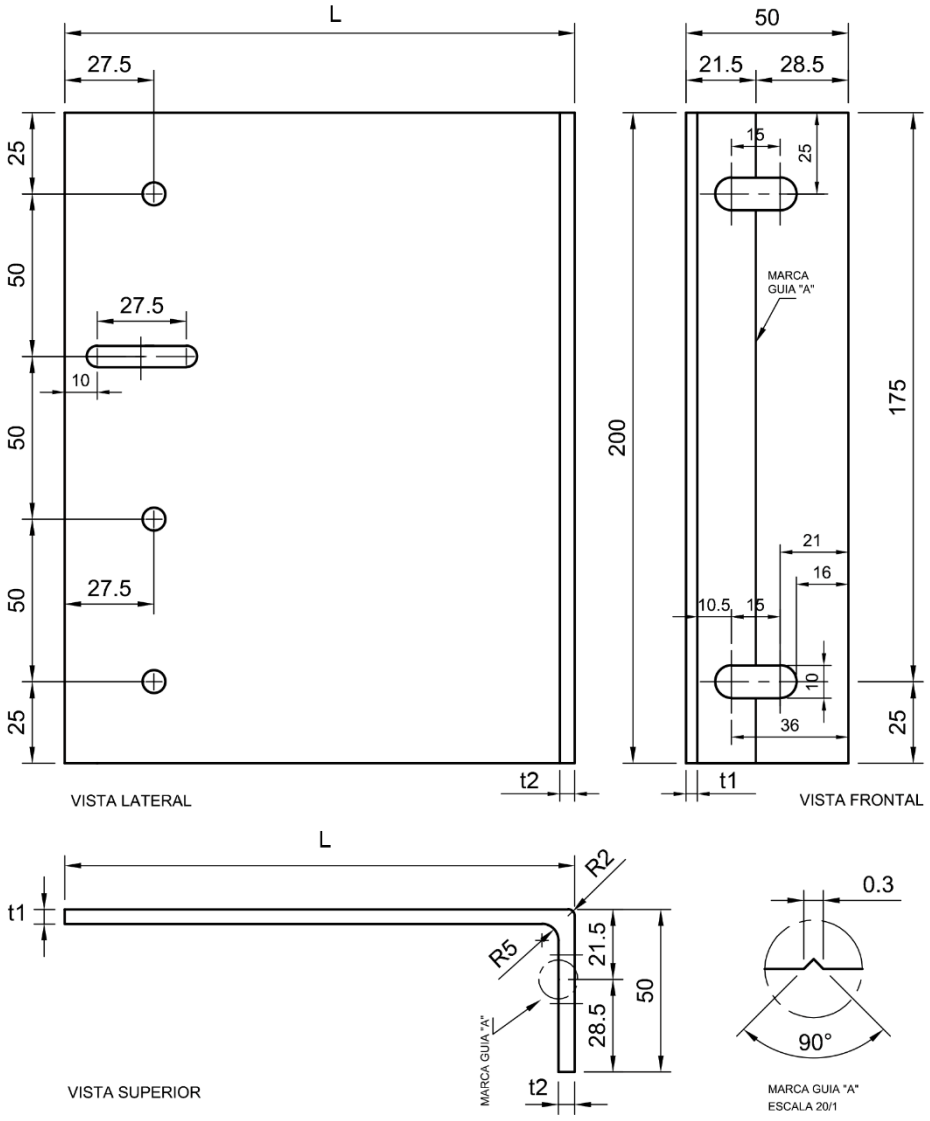


Figure A3.3.3: Brackets ES-ALU-L-E.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

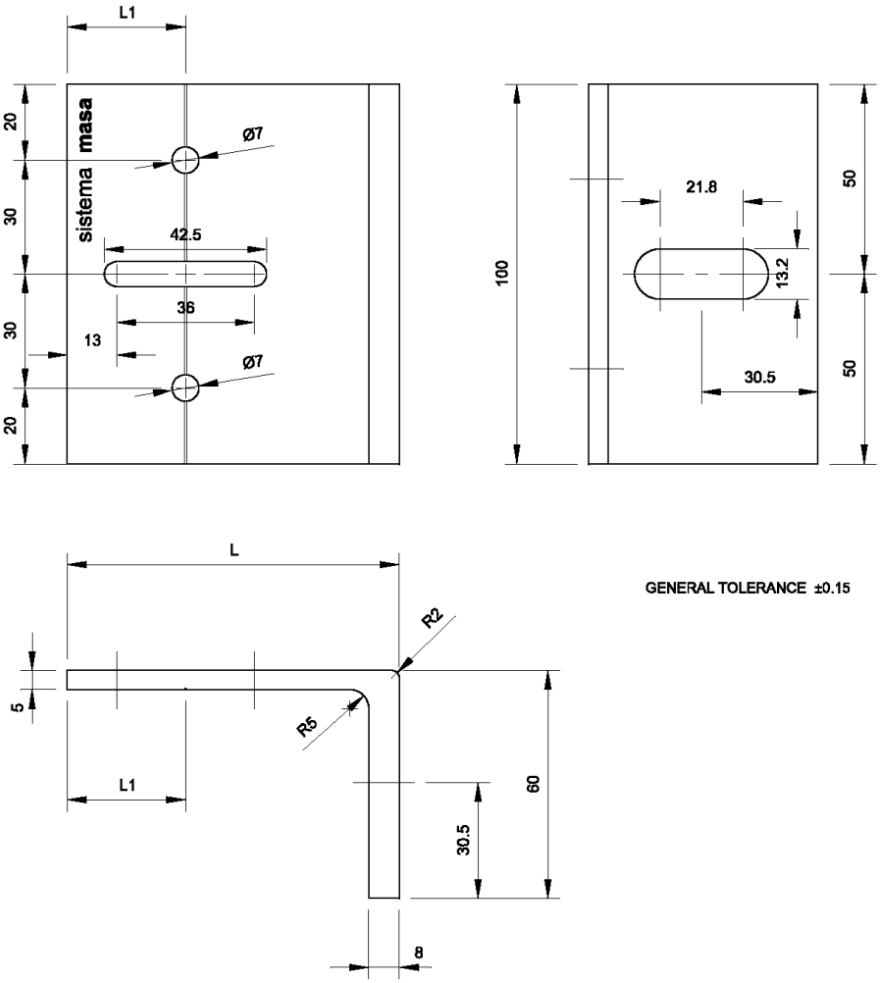


Figure A3.3.4: Brackets ES-ALU-(177/100 & 208/100)-A.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

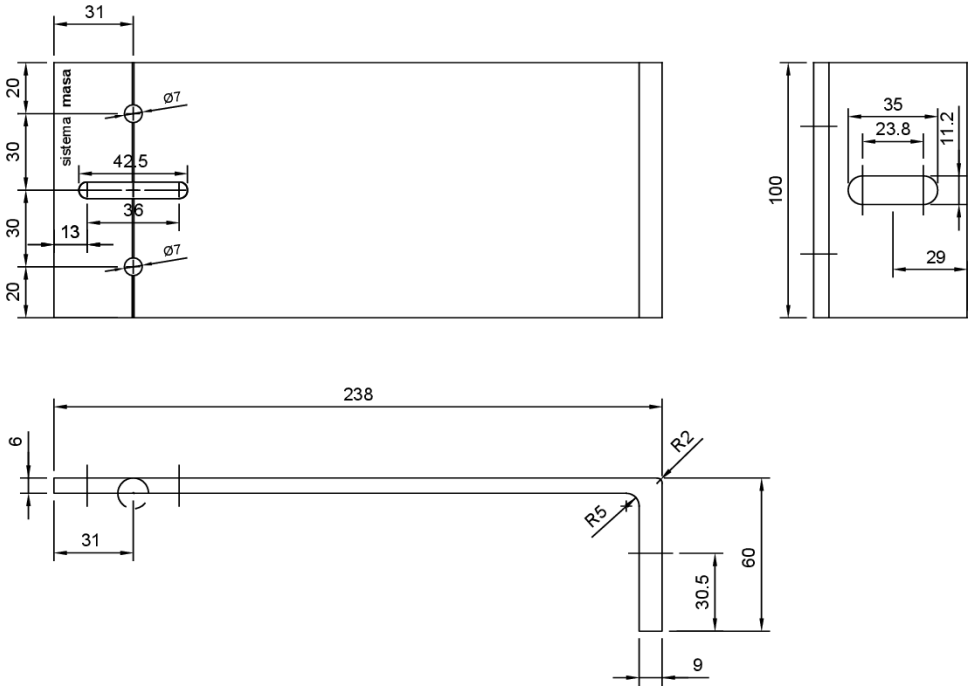


Figure A3.3.5: Brackets ES-ALU-238/100-A.

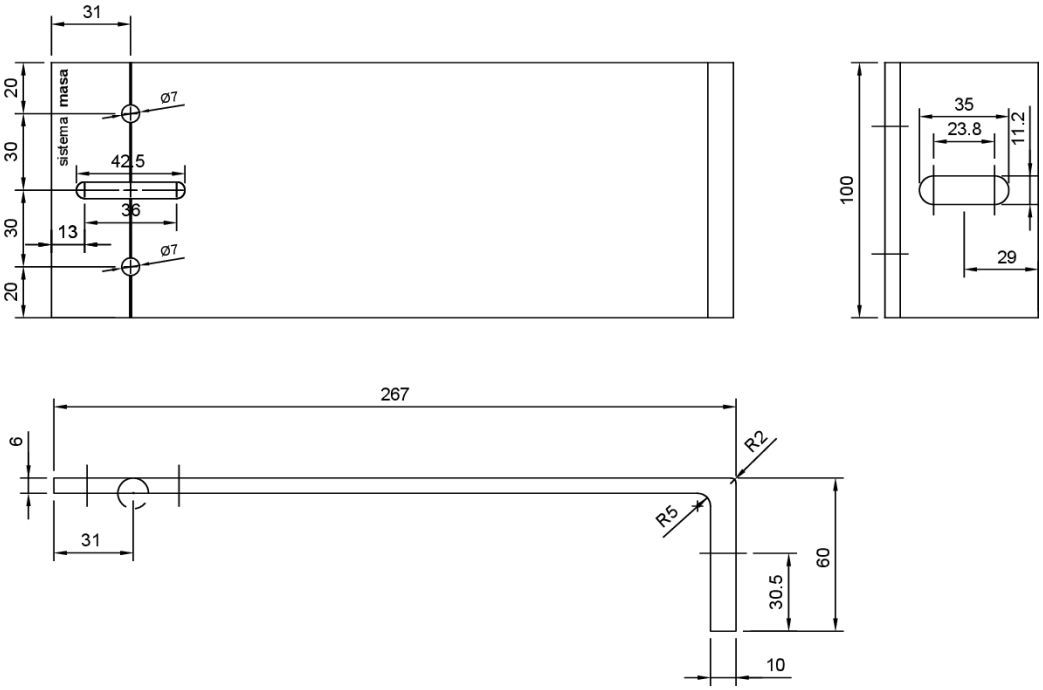


Figure A3.3.6: Brackets ES-ALU-267/100-A.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

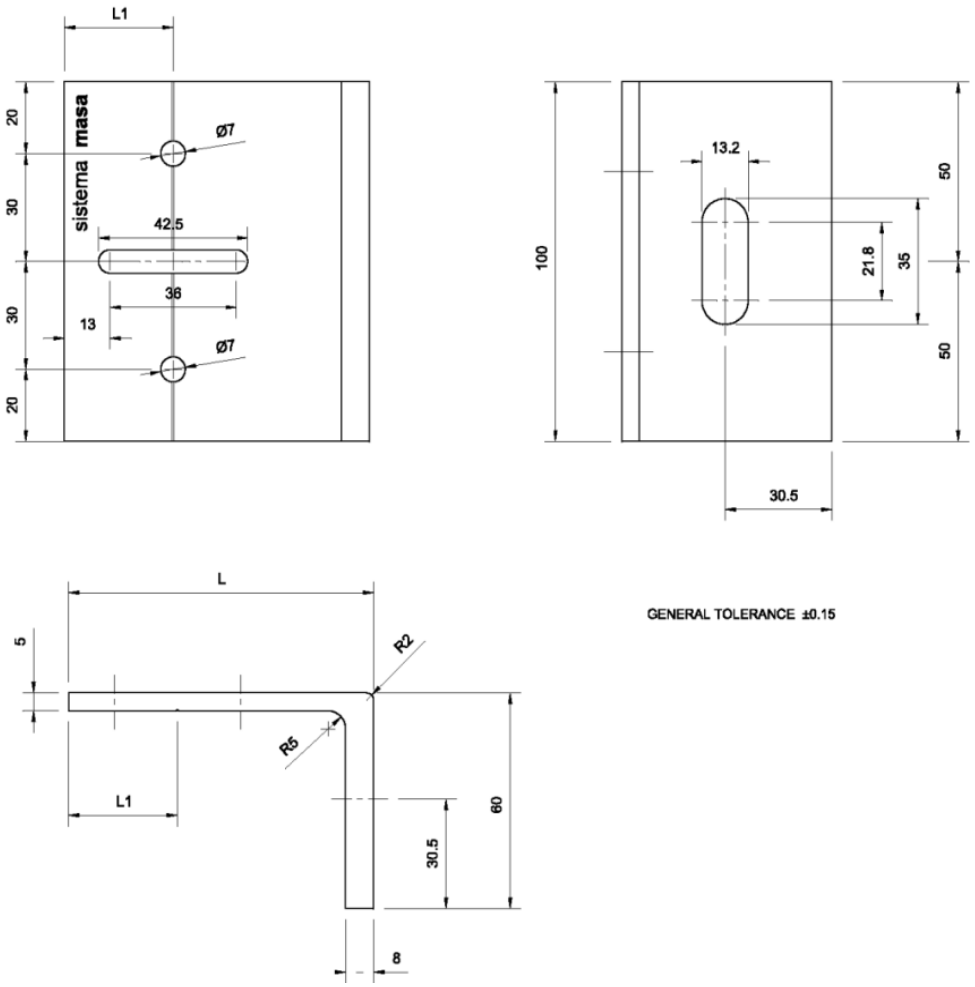


Figure A3.3.7: Brackets ES-ALU-(177/100 & 208/100)-V.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

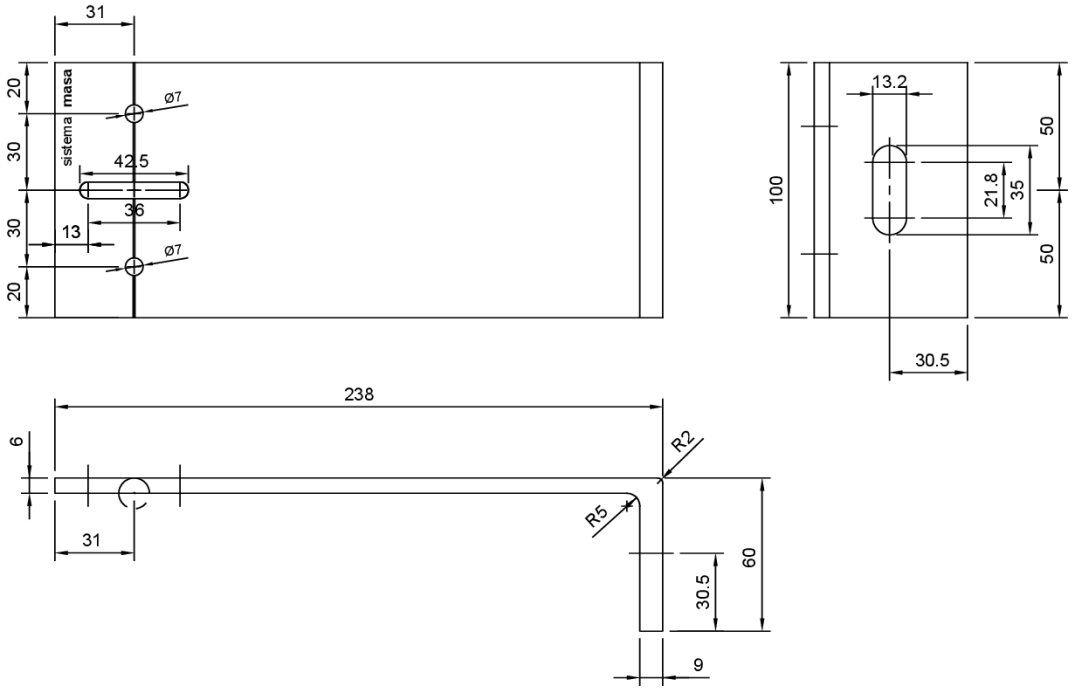


Figure A3.3.8: Brackets ES-ALU-238/100-V.

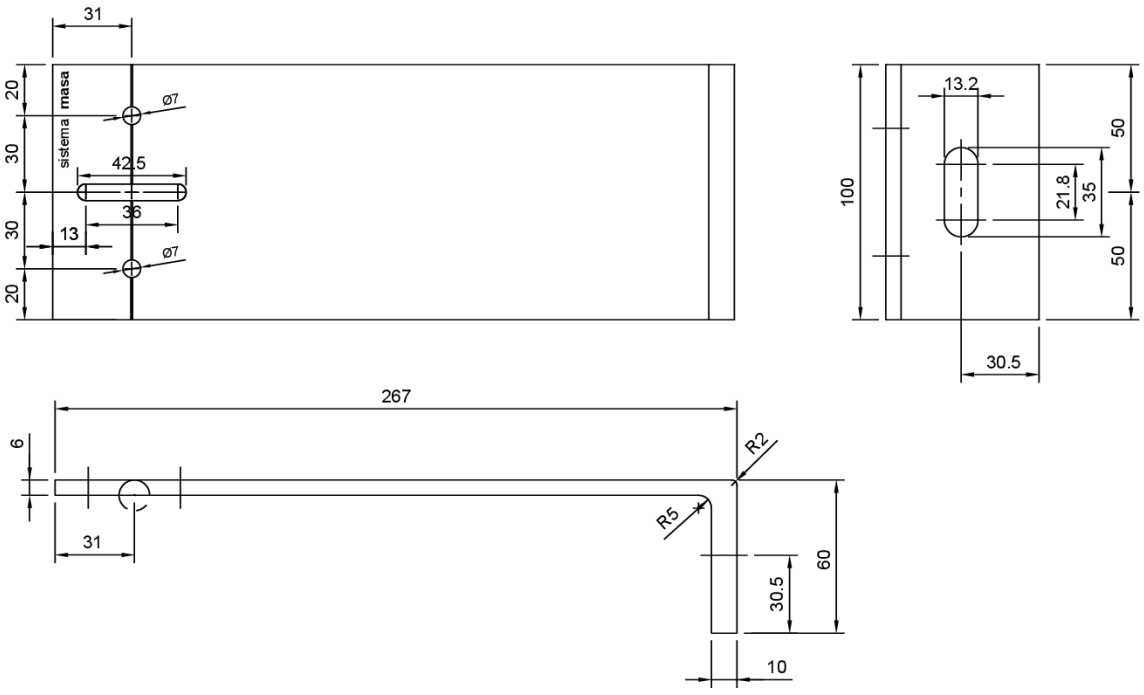


Figure A3.3.9: Brackets ES-ALU-267/100-V.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

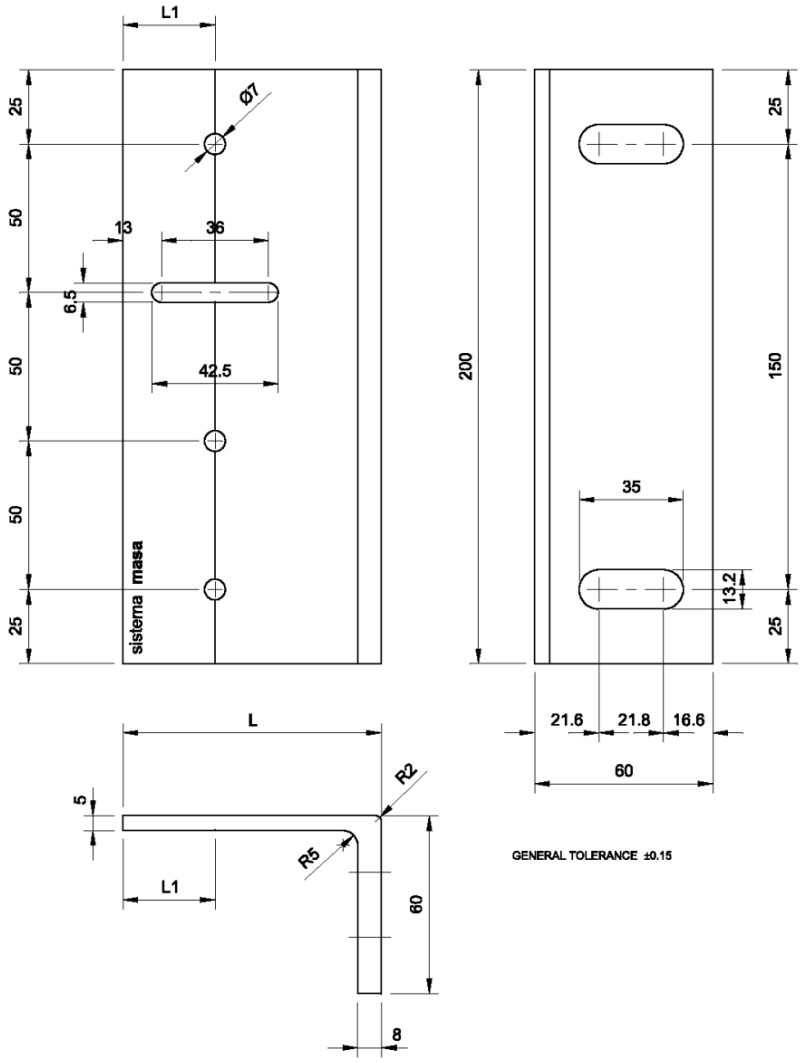


Figure A3.3.10: Brackets ES-ALU-(177/200 & 208/200)-E.

Table A3.3a: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

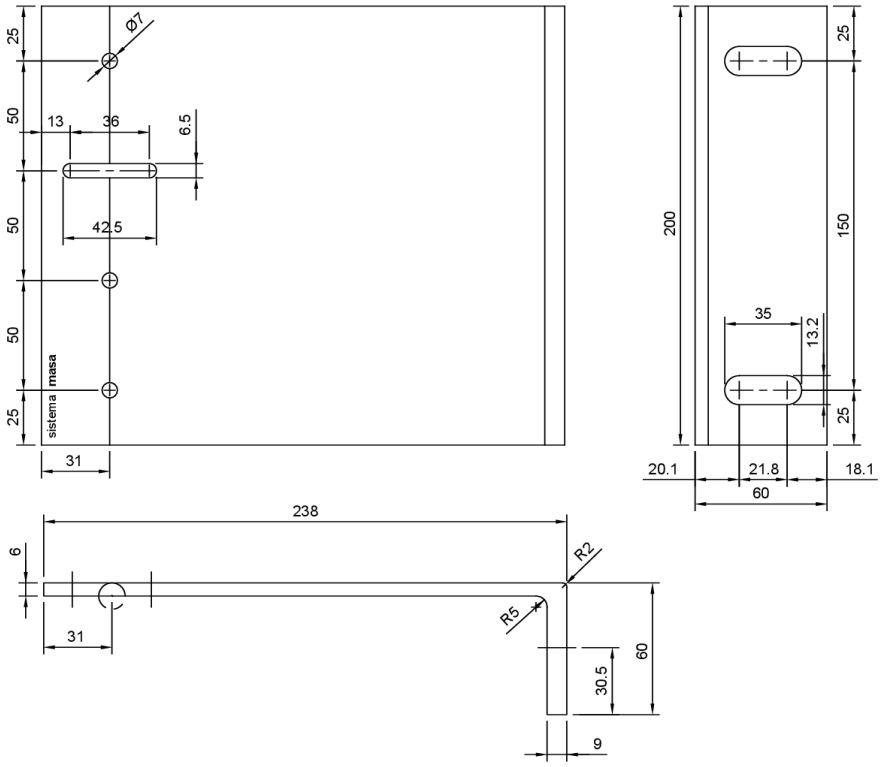


Figure A3.3.11: Brackets ES-ALU-238/200-E.

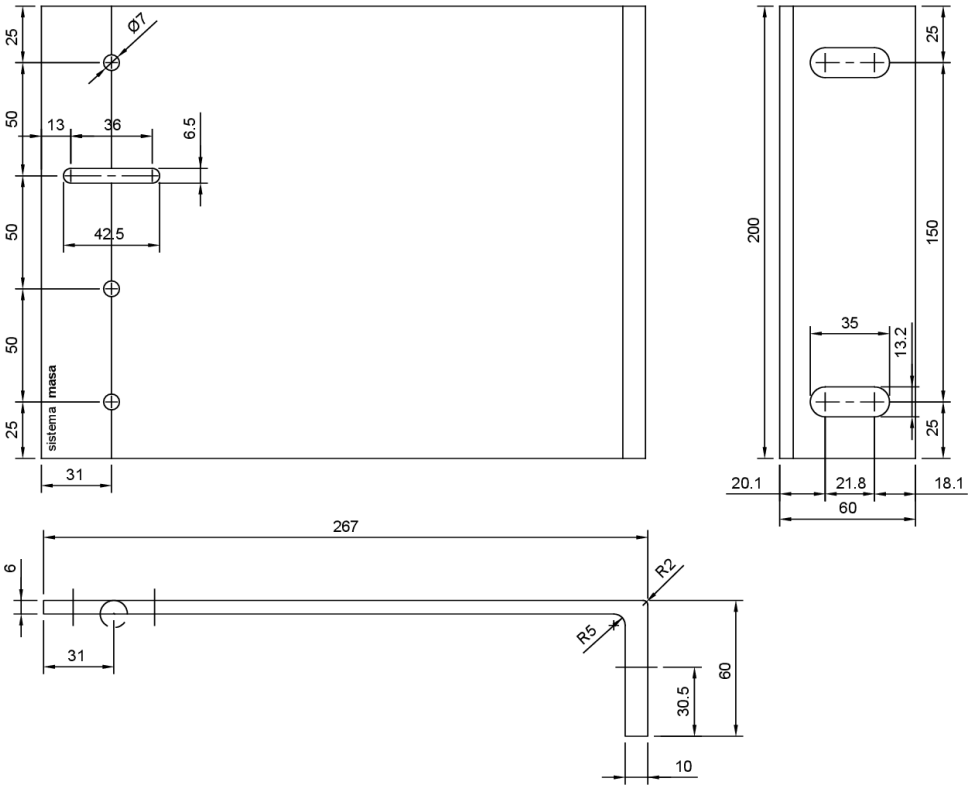


Figure A3.3.12: Brackets ES-ALU-267/200-E.

A3.3.1.2 Stainless steel brackets

Table A3.3b: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties				
Type of bracket (H x L x B x t1 x t2)			**Form and dimensions (mm)**	**Trade name**
ES-INOX-A  Height = 100 mm	100 x L x 60 x 3,0 x 10	L = 238 L1 = 128	Figure A3.3.13	ES-INOX-238/100-A
		L = 267 L1 = 157		ES-INOX-267/100-A
ES-INOX-E  Height = 200 mm	200 x L x 60 x 3,0 x 10	L = 238 L1 = 128	Figure A3.3.14	ES-INOX-238/200-E
		L = 267 L1 = 157		ES-INOX-267/200-E

Material properties		
Characteristic	**Value**	**Reference**
Material	Stainless Steel 1.4307 (X2CrNi18-9)	EN 10088-1 EN 10088-2
Density (kg/m^3)	7900	
Modulus of elasticity at 20 ºC (MPa)	200000	
Thermal expansion coefficient at 20 ºC-100 ºC (µm/m ºC)	16,0	
Elastic limit $R_{p0,2}$ (MPa)	200	
Tensile strength R_m (MPa)	500-700	
Elongation A (%)	45	
Intergranular corrosion resistance at delivery conditions	Yes	

Table A3.3b: Bracket geometric and material properties (L = length; B = base; t = thickness).

Geometric properties

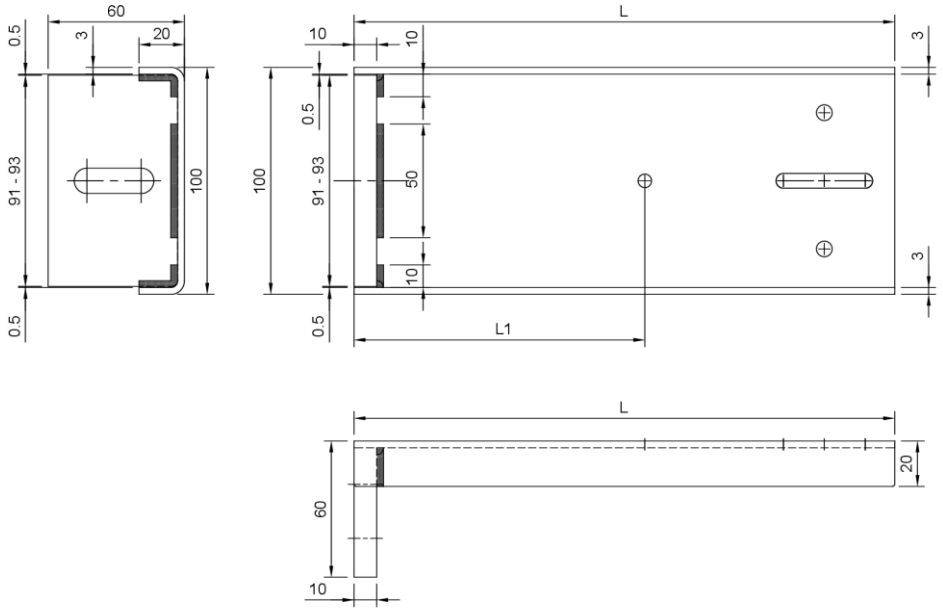


Figure A3.3.13: Brackets ES-INOX-A.

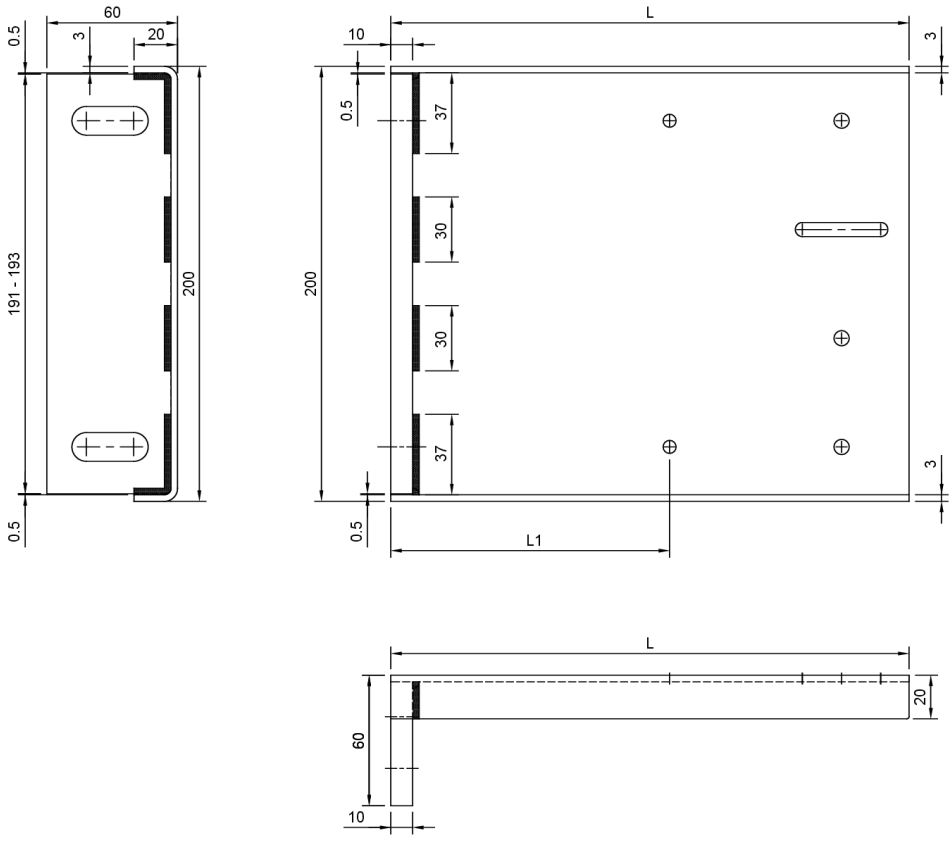


Figure A3.3.14: Brackets ES-INOX-E.

A3.3.2 Horizontal profile configuration (PF-AL-TH/SOV)

Brackets used for horizontal profile configuration are indicated in clause A3.3.1.

A3.4 Subframe fixings

Table A3.4: Subframe fixings.

Fixing elements		**Geometry**		**Material**		**Reference**
Position		**Type**	**Dimensions**	**Type**	**Class**	---
Between cladding element fixings (clips) and vertical profiles	GR-SOV-P	Self-drilling screw – countersunk head	2,9 x 13 mm	Stainless steel	A2-70	EN ISO 3506-1 EN ISO 3506-4 EN ISO 15480 EN ISO 10666
	other GR-SOV clips	Self-drilling screw – allen head	4,2 x 16 mm			
Between horizontal profiles and vertical profiles		Self-drilling screws – hexagonal head	6,3 x 25 mm		A2-70 / A4-80	
Between vertical profiles and brackets						

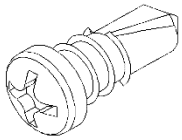


Figure A3.4.1: Screw 2,9x13.

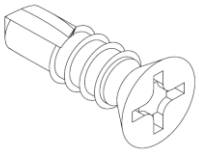


Figure A3.4.2: Screw 4,2x16.

Figure A3.4.3a: Screw 6,3x25.

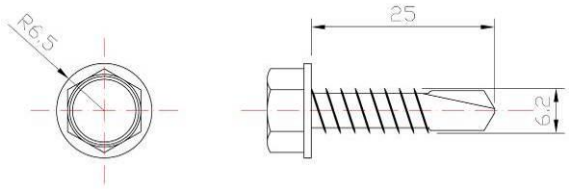


Figure A3.4.3b: Screw 6,3x25.

A3.5 Ancillary components

A3.5.1 Ancillary profiles

Table A3.5: Geometric and material properties of the ancillary profiles.

Geometric properties						
Type of profile		**Form and dimensions (mm)**	**Weight per linear metre (kg/m)**	**Cross section (mm^2)**	**Inertia of profile section (cm^4)**	
					I_{xx}	I_{yy}
Ancillary profiles between vertical profiles						
EUP-PF-AL-T/L	50 x 2,0	Figure A3.5.1	0,32	116,86	0,015	2,78
EUP-PF-AL-J	41 x 66 x 1,5	Figure A3.5.2	0,83	306,51	15,72	7,52
EUP-AL-JT	41 x 85 x 1,5	Figure A3.5.3	0,98	363,51	30,54	9,77
EUP-AL-TT	40 x 84 x 1,5	Figure A3.5.4	0,98	361,50	32,18	10,26
Ancillary profiles for verticality deviations						
ES-AL-O-20	100 x 20 x 3,0	Figure A3.5.5	1,06	391,78	2,36	30,10
ES-AL-O-40	100 x 40 x 3,0	Figure A3.5.6	1,40	518,64	12,72	37,11

Material properties		
Characteristic	**Value**	**Reference**
Material	EN AW-6005	EN 755 EN 1999-1
Treatment	T6	
Durability class	B	
Specific weight (kg/m^3)	2700	
Elastic limit (MPa)	225	
Elongation (%)	8	
Tensile strength (MPa)	270	
Modulus of elasticity (MPa)	70000	
Poisson coefficient	0,3	
Coefficient of thermal expansion between 50 °C and 100 ºC (µm/(m·ºC))	23,0	

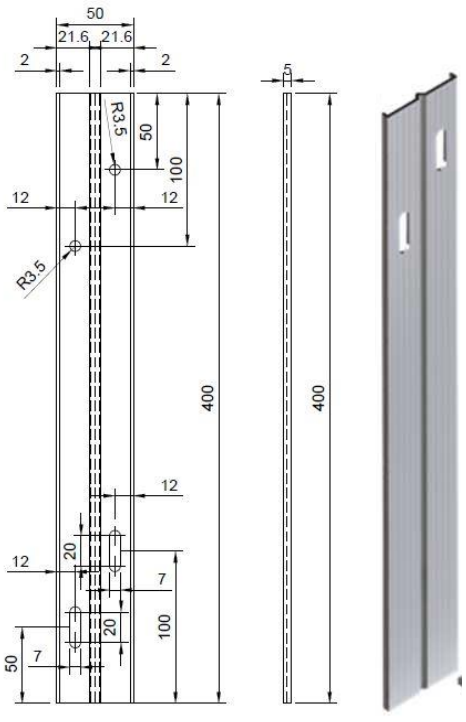


Figure A3.5.1: Ancillary profile EUP-PF-ALT/L.

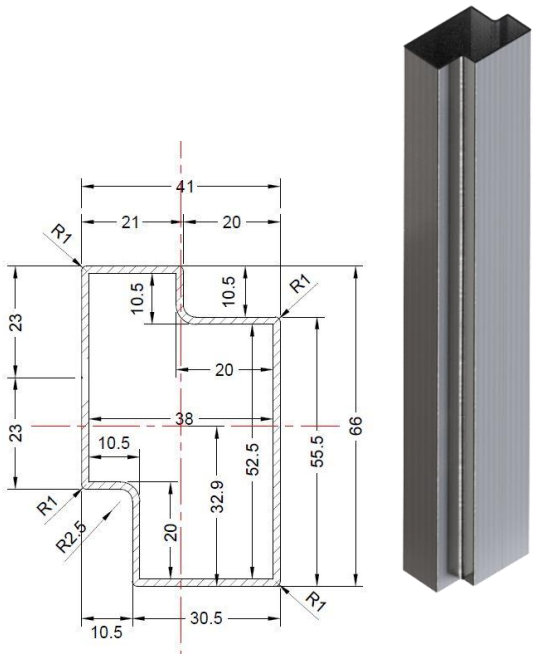


Figure A3.5.2: Ancillary profile EUP-PF-AL-J.

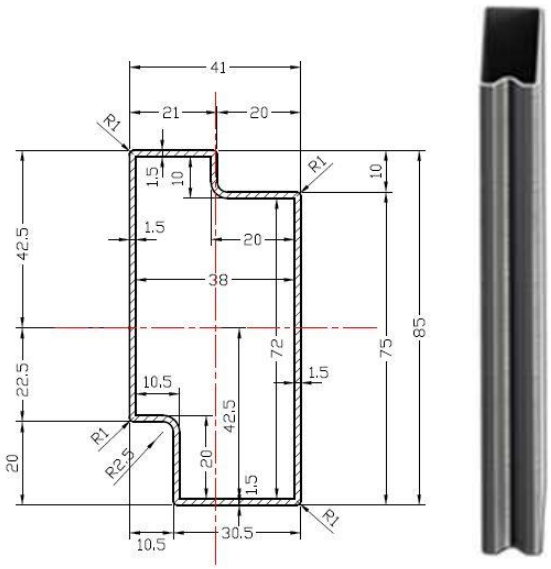


Figure A3.5.3: Ancillary profile EUP-AL-JT.

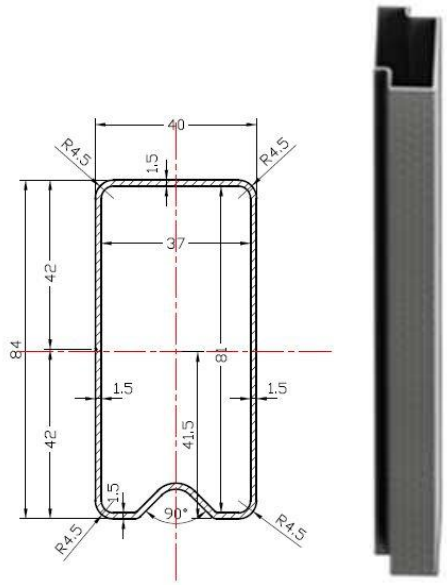


Figure A3.5.4: Ancillary profile EUP-AL-TT.

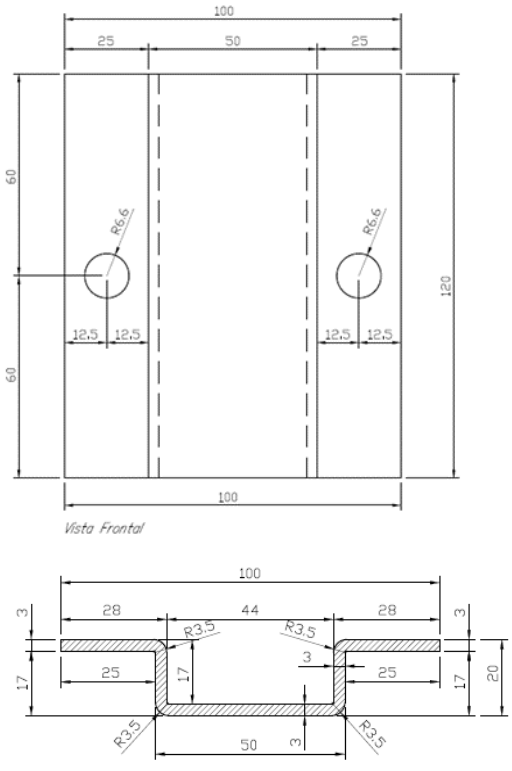


Figure A3.5.5: Ancillary profile ES-AL-O-20.

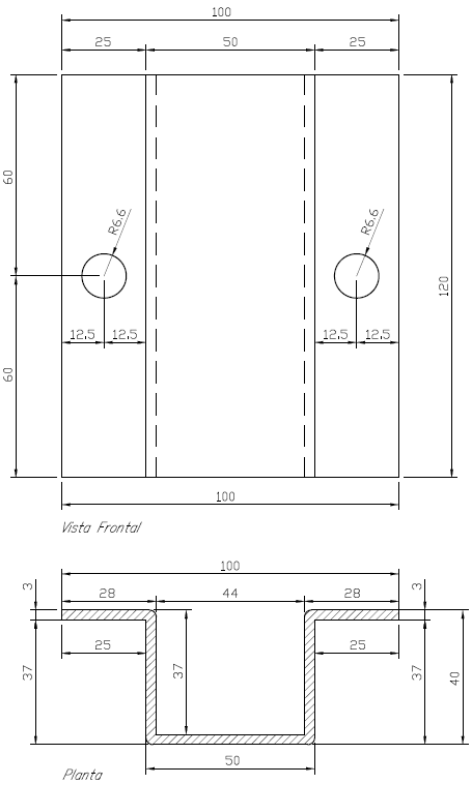


Figure A3.5.6: Ancillary profile ES-AL-O-40.

A3.5.2 Ancillary thermal bridge break piece

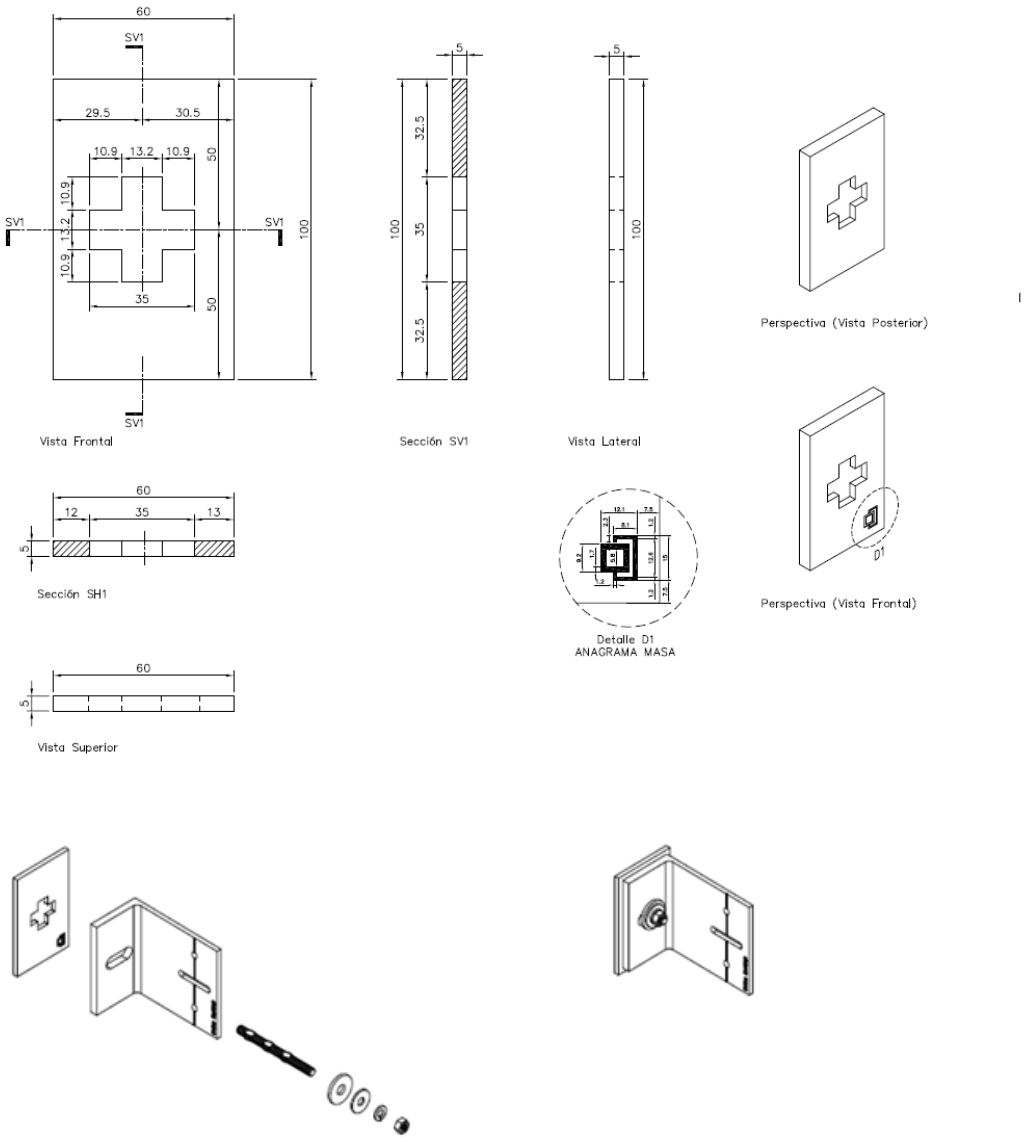


Figure A3.5.7: Thermal bridge break piece Termostop 100.

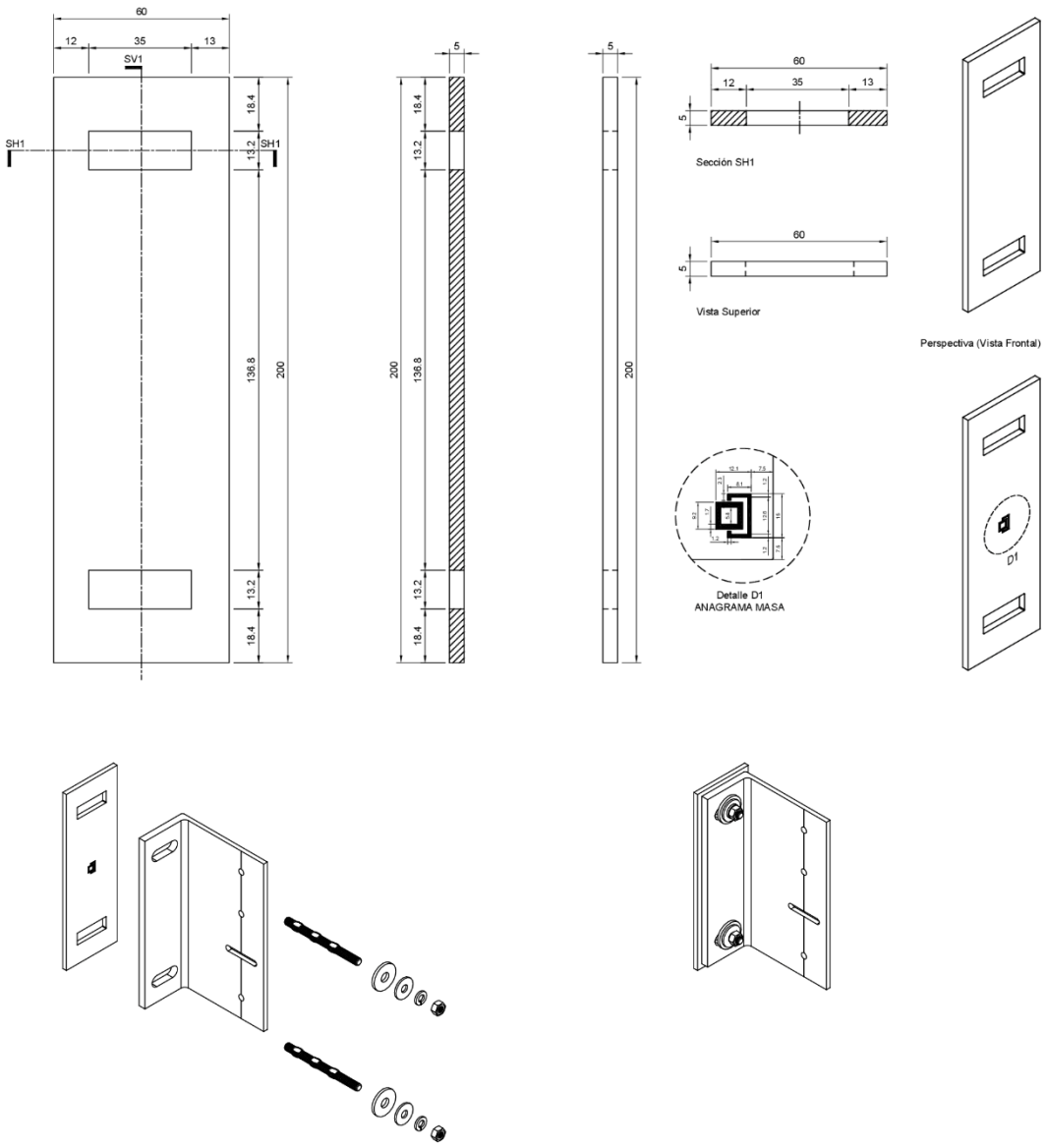


Figure A3.5.8: Thermal bridge break piece Termostop 200.

A3.6. Other components

Other products that do not pertain to the kit but they are needed for the execution of the PF-ALT-SOV kit in the works are the fixings between the brackets and the substrate. The main specifications to be met by these products to be used with the kit are:

- Fixings must be chosen according to the substrate or supporting structure material (concrete, masonry, timber or metal frame, etc.) and the resistance required due to wind load and dead load (pull-out and shear strength respectively).
- Fixings between the brackets and the substrate may be CE marked according to an ETA on the basis of the relevant EAD (see www.eota.eu) as long as this CE marking is mandatory in the Member State where the kit is used.

ANNEX 4: Design, installation, maintenance and repair criteria

A4.1 Design

Adhesive system

The design of the external wall claddings in ventilated façades using adhesive system for bonding the opaque cladding elements on aluminum alloy subframe of vertical profiles should consider:

- Failure of the adhesive bead might cause risk to human life and/or have considerable economic consequences. Therefore, special care should be considered with respect to:
  - The verification of the minimum dimension of the adhesive bead bite, bead length and minimum number of beads by each cladding element by means of calculation, considering the design values given in table 1.2 of this ETA. National safety factors, other national provisions and specific provisions given by the kit manufacturer must be followed.
  - The verification of the adherence resistance on the specific materials (cladding element and subframe profile) to be used on-site (see table 2.1) by means of the peel test (see clause 3.4.2.1 of EAD 090097-00-0404) in normal conditioning and after ageing.
  - The verification of the specific qualification and training of the adhesive system installer.
- When the cladding elements are bonded to subframe with vertical profiles, the adhesive bead shall be applied in the same direction than this vertical profile (vertically). When the cladding elements are bonded to subframe with horizontal profiles, the adhesive bead shall be applied vertically and discontinuously along the horizontal profile length.
- It is assumed that the substrate wall meets the necessary requirements regarding the mechanical strength (resistance to static and dynamic loads) and the airtightness, as well as the relevant resistance regarding watertightness and water vapour.
- The verification of the whole external wall cladding design (including cladding elements, subframe components and anchors to the substrate wall) by means of calculation, considering the mechanical characteristic values of each component in order to resist the actions (dead loads, wind loads, hygrothermal loads, etc.) applying on the specific works. National safety factors and other national provisions must be followed.
- The accommodation of the designed system movements to the substrate wall or structural movements.
- The execution of singular parts of the façade; construction details regarding drainage and ventilation provisions should be considered. Water stagnation is not allowed in the vicinity of the adhesive bead. Therefore, the bonded cladding shall be designed with an efficient drainage and ventilation.
- The corrosion protection of the metallic components taking into account the category of corrosivity of the atmosphere of works (e.g. acc. ISO 9223).
- Because usually the joints are not watertight, the first layer behind ventilated air space (e.g. insulation layer) should be composed by materials with low water absorption.

Subframe components and supplementary mechanical cladding fixings

The design of the subframe and supplementary mechanical cladding fixings using PF-ALT-SOV kit should consider:

- All the kit components defined in Annexes 2 to 3 may be used.
- The PF-ALT-SOV kit can be used for cladding elements with groove and thickness between 3 mm and 20 mm. The maximum weight and area shall be determined according to the mechanical properties of the kit components declared in this ETA (see clauses 3.2 to 3.9). The maximum density that can be considered is 3000 kg/m^3.
- It is assumed that the substrate wall meets the necessary requirements regarding the mechanical strength (resistance to static and dynamic loads) and airtightness, as well as the relevant resistance regarding watertightness and water vapour.

- It is assumed that the cladding element meets the necessary requirements regarding the mechanical resistance and hygrothermal behaviour.
- The verification of the designed system by means of calculation, taking into account the mechanical characteristic values of the kit components in order to resist the actions (dead loads, wind loads, etc.) applying on the specific works. National safety factors and other national provisions must be followed.
- The selection and verification of the anchors between the brackets and the external walls (substrate), taking into account the substrate wall material and the minimum resistance required (pull-out and shear resistance) according to the envisaged actions obtained from the mechanical calculation of the designed system.
- The accommodation of the designed system movements to the substrate wall or structural movements.
- The execution of singular parts of the façade.
- The corrosion protection of the designed system metallic components taking into account the category of corrosivity of the atmosphere of works (e.g. acc. ISO 9223).
- The drainability of the ventilated air space between the cladding elements and the insulation layer or the external wall accordingly.
- An insulation layer is usually fixed on the external wall and should be defined in accordance with a harmonized standard or a European Technical Assessment.
- When the cladding element joints are not watertight, the first layer behind ventilated air space (e.g. insulation layer) should be composed by materials with low water absorption.

A4.2 Installation

Installation of the subframe and supplementary mechanical cladding fixings using PF-ALT-SOV kit should be carried out:

- According to the specifications of the manufacturer and using the components specified in this ETA.
- In accordance with the design and drawings prepared for the specific works. The manufacturer should ensure that the information on these provisions is given to those concerned.
- By appropriately qualified staff and under the supervision of the technical responsible of the specific works.

Installation of the external wall claddings for ventilated façades using adhesive system, in addition to specified above, should be carried out as well:

- Components shelf life and storage conditions must be respected (see tables in Annex 2 of this ETA).

A4.3 Maintenance and repair

Adhesive system

Maintenance of the external wall claddings for ventilated façades using SikaTack® Panel-50 adhesive system includes inspections on-site, to observe the appearance of any damage as cracking, detachment, delamination, mould presence, corrosion presence or water accumulation due to permanent moisture or permanent irreversible deformation.

When necessary, any repair to localized damaged areas must be carried out with the same components and following the repair instructions given by the manufacturer.

Subframe components and supplementary mechanical cladding fixings

Maintenance of the subframe and fixings for fastener external cladding elements using PF-ALT-SOV kit includes inspections on site, taking into account the following aspects:

- the appearance of any permanent irreversible deformation.
- the presence of corrosion or presence of water accumulation.

When necessary, any repair to localized damaged areas must be carried out with the same components and following the repair instructions given by the manufacturer.