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European Technical Assessment

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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	FTS 503B+ kit
Product family to which the construction product belongs	Kits for external wall claddings glued to the subframe
Manufacturer	LOUVELIA FACADE SOLUTIONS, S.L. Av. Alcalde Caballero 16 ES-50014 Zaragoza Spain
Manufacturing plant(s)	Virgen del Buen Acuerdo, 2 Pol. Ind. Alcalde Caballero ES-50014 Zaragoza Spain
This European Technical Assessment contains	25 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 <i>Kits for external wall claddings glued to the subframe.</i>

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.

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Specific parts of the European Technical Assessment

1 Technical description of the product

FTS 503B+ kit is a subframe and adhesive kit (Type B according to EAD 090097-00-0404) for fastening cladding elements.

FTS 503B+ 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 wall are not part of the kit assessed in this ETA.

Table 1.1: Kit components.

N.	Generic component	FTS 503B+ (*)			Technical description
1	Adhesive system	Adhesive	SikaTack® Panel-50: One component silicone-based adhesive. Design characteristics are given in table 1.2.	SOLTEC Panel-Fix®: One component elastomeric adhesive based on silane terminated polymer. 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)	SOLTEC Panel-Fix® Primer 451SW: Black primer for the treatment of various surfaces	
		Ancillary components	SikaTack® Panel-Tape: double-sided adhesive closed-cell polyethylene spacer tape. Sika® Aktivator-205: Surface pre-treatment and cleaning agent.	SOLTEC Panel-Fix® C Tape: double-sided adhesive tape. SOLTEC Panel-Fix® P202 Adhesion Promoter: Surface pre-treatment.	
3	Subframe	Horizontal profile (**)	Aluminium alloy profiles		Annex 3
		Vertical profile	Aluminium alloy profiles		
		Bracket	Aluminium alloy brackets		
		Subframe fixings	Stainless steel screws: between vertical profiles and brackets Alu/Inox rivet: between horizontal profile and vertical profile.		

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

(**) Supplementary mechanical cladding fixing.

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

The FTS 503B+ kit is a non-load bearing construction element. It does not contribute to the stability of the structure on which they are 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 structure¹.
- The other layers of the façade, like insulation and internal layers.

¹ The term "supporting structure" refers to both of followings 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: Adhesives design characteristics.

Characteristic		Value	
		SikaTack® Panel-50 Adhesive	SOLTEC Panel-Fix® Adhesive.
Adhesive			
Thickness	e (mm)	3,0	3,0
Adhesive bead (bite)	b (mm)	≥ 12,0	≥ 12,0
Maximum design tensile stress	σ_{des} (MPa)	0,15	0,22
Maximum design shear stress	τ_{des} (MPa)	0,012	0,007
Maximum hygrothermal displacement in dynamic shear	$\Delta L_{s,des}$ (mm)	1,35	1,35

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

FTS 503B+ 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 structures¹ which meet the mechanical strength requirements.

Materials of cladding elements and subframe profiles intended to be used with FTS 503B+ kits 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 20/1269 includes the specific cladding element trade names accepted by the manufacturer to be used with FTS 503B+ 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 FTS 503B+ 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.

FTS 503B+ 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.

FTS 503B+ 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 FTS 503B+ 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 FTS 503B+ kits performance (see also detailed performance in relevant clauses).

Basic Works Requirement	ETA clause	Essential characteristic	Performance		
			Kit that includes SikaTack® Panel-50 Adhesive system	Kit that includes SOLTEC Panel-Fix® Adhesive system	
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 load resistance	2400 Pa	4000 Pa	
	---	Impact resistance	Not relevant for kit type B		
	---	Bending strength of cladding element	Not relevant for kit type B		
	3.2	Initial mechanical resistance of the glued connection	Tensile stress at normal temperature (+ 23 °C)	$\sigma_{u,c} = 1,45 \text{ MPa}$	$\sigma_{u,c} = 1,48 \text{ MPa}$
			Shear stress at normal temperature (+ 23 °C)	Not assessed	
	3.3	Residual mechanical resistance of the glued connection	Tensile stress at high temperature (+ 80 °C)	$\sigma_{u,c} = 1,47 \text{ MPa}$	$\sigma_{u,c} = 1,23 \text{ MPa}$
			Tensile stress at low temperature (- 20 °C)	$\sigma_{u,c} = 1,39 \text{ MPa}$	$\sigma_{u,c} = 1,73 \text{ MPa}$
			Tensile stress after ageing under temperature and high humidity	$\sigma_{u,c} = 0,97 \text{ MPa}$	$\sigma_{u,c} = 1,35 \text{ MPa}$
			Tensile stress after immersion in water	$\sigma_{u,c} = 1,31 \text{ MPa}$	$\sigma_{u,c} = 1,04 \text{ MPa}$
			Tensile stress after ageing under high humidity and NaCl atmosphere	$\sigma_{u,c} = 1,32 \text{ MPa}$	$\sigma_{u,c} = 1,12 \text{ MPa}$
Tensile stress after ageing under high humidity and SO ₂ atmosphere			$\sigma_{u,c} = 1,00 \text{ MPa}$	$\sigma_{u,c} = 1,16 \text{ MPa}$	
Tensile stress after cyclic tensile loads			$\sigma_{u,c} = 1,12 \text{ MPa}$	$\sigma_{u,c} = 1,28 \text{ MPa}$	
Tensile stress after cyclic shear loads			$\sigma_{u,c} = 1,24 \text{ MPa}$ $S_{t,m} = 9,7\%$	$\sigma_{u,c} = 1,52 \text{ MPa}$ $S_{t,m} = 13,1\%$	
3.4	Resistance of profiles	See Annex 3			
3.5	Pull-out resistance of subframe fixings	See table 3.5			

Table 3.1: Summary of the FTS 503B+ kits performance (see also detailed performance in relevant clauses).

Basic Works Requirement	ETA clause	Essential characteristic	Performance	
			Kit that includes SikaTack® Panel-50 Adhesive system	Kit that includes SOLTEC Panel-Fix® Adhesive system
	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 table 3.5	
BWR 5 Protection against noise	---	Airborne sound insulation	Not relevant for kit type B	
BWR 6 Energy economy and heat retention	---	Thermal resistance	Not relevant (kit without thermal insulation in ventilated façade)	
	---	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	
Durability	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 FTS 503B+ kit itself.

3.1 Wind load resistance

FTS 503B+ 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)
Suction on FTS 503B+ with SikaTack® Panel-50 adhesive system (1)	2400 (2)	9,85 (4)	0,66 (4)	1910 (8)
Suction on FTS 503B+ with SOLTEC Panel-Fix® adhesive system (1)	4000 (3)	15,75 (5)	1,23 (6)	

(1) Tested specimen: six vertical profiles 500 mm (maximum distance) span; cladding elements, two tiles (900 mm x 1000 mm and 1000 mm x 2000 mm) with two spans (three vertical supports) and three simply supported tiles (two 450 mm x 1000 mm and one 500 mm x 2000 mm) with one span; two horizontal profiles (1000 mm and 2400 mm long), span 1000 mm; three brackets 750 mm span for each vertical profile. Used adhesive system SikaTack® Panel-50 with adhesive bead of 12,5 mm x 4 mm (width x thickness) on vertical profiles (one bead on each tile support) with 940 mm and 1940 mm of effective length. Used adhesive system SOLTEC Panel-Fix® with adhesive bead of 12 mm x 4 mm (width x thickness) on vertical profiles (one bead on each tile support) with 940 mm and 1940 mm of effective length. Characteristics of components are indicated in Annexes 2 and 3.

(2) Breakage of 1000 mm x 2000 mm tile at 2500 Pa. SikaTack® Panel-50 on the right-side profile and on the central profile peels off. According to the adhesive manufacturer the failure of this test specimen was due to lack of curing.

(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 and deformation measured on the centre of the 900 mm x 1000 mm tile.

(5) Maximum displacement measured on the centre of the 500 mm x 2000 mm tile.

(6) Maximum deformation measured on the centre of the 1000 mm x 2000 mm tile.

(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 by the characteristic resistance value of the 60 x 100 x 60 x 3 mm central bracket at 1 mm of permanent deflection.

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: Adhesives mechanical resistances.

Adhesive system	Test type		Breaking tensile stress (MPa)		Elongation at break (%)		Ratio	Cohesive rupture (%)
			$\sigma_{u,m}$	$\sigma_{u,c}$	$\epsilon_{u,m}$	$\epsilon_{u,c}$	ΔX_m	$C_{r,m}$
SikaTack® Panel-50	Initial	NT	1,55	1,45	283	224	---	100
		HT (+ 80 °C)	1,59	1,47	218	175	1,03	100
		LT	1,51	1,39	269	193	0,97	99
	Residual	HT+HR	1,25	0,97	240	188	0,81	96
		H ₂ O	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

Table 3.3: Adhesives mechanical resistances.

Adhesive system	Test type	Breaking tensile stress (MPa)		Elongation at break (%)		Ratio	Cohesive rupture (%)	
		$\sigma_{u,m}$	$\sigma_{u,c}$	$\epsilon_{u,m}$	$\epsilon_{u,c}$	ΔX_m	$C_{r,m}$	
SOLTEC Panel-Fix®		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	100
	Initial	NT	1,64	1,48	154	112	---	94
		HT (+ 60 °C)	1,33	1,23	100	85	0,81	98
		LT	1,92	1,73	146	104	1,17	92
		HT+HR	1,63	1,35	151	119	1,00	97
		H ₂ O	1,20	1,04	131	115	0,73	91
	Residual	HR+NaCl	1,30	1,12	158	109	0,81	96
		HR+SO ₂	1,24	1,16	127	89	0,76	97
		CTL	1,68	1,28	136	77	1,02	99
		CSL	1,67	1,52	NA	NA	1,02	98
		TR	1,44	1,31	105	98	0,90	93
		EMC	1,41	1,09	145	94	1,11	97

Where:

NT = At normal temperature, +18 °C to +23 °C.

HT = At high temperature.

LT = At low temperature, -20 °C ± 1 °C.

HT+HR = 1004 ± 4 hours at high temperature, 60 °C ± 2 °C and high relative humidity, 85 ± 2 %.

H₂O = After immersion in water for 7 days at normal temperature.

HR+NaCl = After high humidity and NaCl atmosphere for 480 ± 2 hours.

HR+SO₂ = After high humidity and SO₂ 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.

NA = value not available.

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 SO₂ 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 values for the stabilization load are:

- SikaTack® Panel-50 is $S_{t,m} = 9,7\%$,
- SOLTEC Panel-Fix® is $S_{t,m} = 13,1\%$.

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: Adhesives shear creep results.

Shear creep and climatic ageing	HT+HR	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
SikaTack® Panel-50		0,85	1,19	1,21	1,60	0,36	0,52
SOLTEC Panel-Fix®		L _o + d1 _m	L _o + d1 _c	L _o + d2 _m	L _o + d2 _c	Stv _m	Stv _c
		89,11	90,35	89,70	91,33	0,60	1,12

Where:

HT+HR = 1004 ± 4 hours at high temperature (60 °C ± 2 °C) 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.

L_o = Specimen initial length.

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 (N)		Shear strength (N)	
	F _m	F _c	F _m	F _c
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Multi-grip blind rivet Ø4,0 mm (2 rivets per profile), Alu/Inox.	3032	2640	2647	2235
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Self-drilling screw: Ø5,5 mm, A2 stainless steel. (*)	2155	1784	5234	4956
Profile: Thickness 1,8 mm, AW-6063 aluminium alloy. Self-drilling screw: Ø4,8 mm, A2 stainless steel.	1938	929		

Where:

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

(*) Shear strength not tested. Minimum shear strength value from the tested screw.

(**) 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 (vertical and horizontal 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 H x L x B x t (mm)	Resistance (N) at 1 mm of displacement		Resistance (N) at 3 mm displacement		Resistance (N) at $\Delta L = 0,2\% \cdot L$ mm permanent deflection		Ultimate resistance (N)	
	F _m	F _c	F _m	F _c	F _m	F _c	F _m	F _c
60 x 60 x 60 x 3	933	739	2150	1813	1256	987	4138	3746
60 x 80 x 60 x 3	367	269	933	739	844	719	3188	3029
60 x 100 x 60 x 3 (*)								
60 x 120 x 60 x 3	267	169	550	382	817	705	1839	1667
60 x 140 x 60 x 3 (*)								
60 x 160 x 60 x 3	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
60 x 180 x 60 x 3 (*)								
60 x 200 x 60 x 4	(**)	(**)	(**)	(**)	(**)	(**)	(**)	(**)
60 x 220 x 60 x 4 (*)								
120 x 60 x 60 x 3	1500	1163	5900	5563	2457	1701	13557	12754
120 x 80 x 60 x 3	1033	519	2767	2572	1871	1359	9414	8708
120 x 100 x 60 x 3 (*)								
120 x 120 x 60 x 3	500	500	1567	1372	1529	1370	5229	4796
120 x 140 x 60 x 3 (*)								
120 x 160 x 60 x 3	159	112	448	378	341	190	848	757
120 x 180 x 60 x 3 (*)								
120 x 200 x 60 x 4	220	180	575	517	524	266	1165	1096
120 x 220 x 60 x 4 (*)								
180 x 60 x 60 x 3	1567	788	6867	6478	4667	3965	17900	17008
180 x 80 x 60 x 3	900	563	3367	2978	3250	2574	10713	10142
180 x 100 x 60 x 3 (*)								
180 x 120 x 60 x 3	567	372	2333	1632	2033	1750	5511	5027
180 x 140 x 60 x 3 (*)								
180 x 160 x 60 x 3	453	365	1016	969	793	660	1714	1613
180 x 180 x 60 x 3 (*)								
180 x 200 x 60 x 4	507	357	1184	1085	912	722	1994	1836
180 x 220 x 60 x 4 (*)								

Where:

L = length; H = height; B = base; t = thickness

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

(*) Tested bracket which gives value to the other stronger brackets.

(**) Bracket not considered for this use.

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

Table 3.6b: Bracket resistance to horizontal load.

Bracket H x L x B x t (mm)	Resistance (N) at 1 mm of permanent deflection		Ultimate resistance (N)	
	F _m	F _c	F _m	F _c
60 x 60 x 60 x 3	1380	472	3440	3050
60 x 80 x 60 x 3				
60 x 100 x 60 x 3	1367	896	3417	3162
60 x 120 x 60 x 3				
60 x 140 x 60 x 3 (*)				
60 x 160 x 60 x 3	2340	1480	4213	4016
60 x 180 x 60 x 3 (*)				
60 x 200 x 60 x 4	3838	2695	7343	6881
60 x 220 x 60 x 4 (*)				
120 x 60 x 60 x 3	1800	1371	5050	2683
120 x 80 x 60 x 3				
120 x 100 x 60 x 3 (*)	2300	1766	4200	3810
120 x 120 x 60 x 3				
120 x 140 x 60 x 3	2767	2068	5233	4482
120 x 160 x 60 x 3	1440	1148	2382	2251
120 x 180 x 60 x 3 (*)				
120 x 200 x 60 x 4	1888	1074	3565	3385
120 x 220 x 60 x 4 (*)				
180 x 60 x 60 x 3	1933	1405	4967	4457
180 x 80 x 60 x 3				
180 x 100 x 60 x 3 (*)	2100	1239	4233	3724
180 x 120 x 60 x 3				
180 x 140 x 60 x 3	2367	1857	4467	4016
180 x 160 x 60 x 3	1723	1492	2980	2843
180 x 180 x 60 x 3 (*)				
180 x 200 x 60 x 4	2629	2042	4708	4222
180 x 220 x 60 x 4 (*)				

Where:

H = height; L = length; B = base; t = thickness

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

(*) Tested bracket which gives value to the other stronger brackets.

(**) 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 linear cladding fixings (pull-through) has been assessed according to clause 2.2.5.3 of EAD 090097-00-0404. Mean and characteristic values are given in table 3.5.

3.9 Behaviour after immersion in water

Behaviour after immersion in water of the FTS 503B+ 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 FTS 503B+ kit 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 SO₂ atmosphere are given in table 3.3.

Regarding the metallic kit components:

- The vertical profiles, the horizontal profiles and the brackets are made of aluminium alloy AW-6063 according to EN 573, EN 1999 and EN 755. The durability is class B and the minimum thickness is 1,8 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.
- The subframe drilling screws are made of stainless steel, quality A2 according to EN ISO 3506-1 and the multi-grip blind rivets are made of aluminium-stainless steel. 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 Commission², 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
	External finishes of walls	Any	2+
Kits for external wall claddings glued to the subframe	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 ITeC³, with which the factory production control shall be in accordance.

Issued in Barcelona on 6 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: FTS 503B+ assembled system



Figure A1.1: FTS 503B+ assembled system.

ANNEX 2: Adhesive system

FTS 503B+ kit can include two different adhesive systems:

- SikaTack® Panel-50 (see clause A2.1).
- SOLTEC Panel-Fix® (see clause A2.2).

A2.1 SikaTack® Panel-50

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 °C to 40 °C
Skin time at 23 °C / 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 °C to 150 °C
Shelf-life storage below 25 °C	CQP 016-1	9 months
Shrinkage	EN ISO 10563	Change in mass: $\Delta m = - 2,7\%$ (*) Change in volume $\Delta V = - 4,1\%$ (*)
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 °C to 40 °C
Application method	---	Brush, felt or foam applicator
Consumption	---	50 ml/m ² approx. (*)
Flash-off time	---	10 min. (≥ 15 °C) 30 min. (< 15 °C) 8 hours (maximum)
Shelf-life storage below 25 °C, sealed container in dry place	CQP 016-1	9 months
CQP = Corporate Quality Procedure. (*) Depending on the surface porosity 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 °C to 40 °C
Application method	---	Wiping with lint-free paper towel
Consumption	---	20 ml/m ² approx. (*)
Flash-off time at 23 °C / 50% RH (**)	---	Minimum: 10 min. Maximum: 2 hours
Shelf-life storage below 25 °C, sealed container in dry place	---	12 months
CQP = Corporate Quality Procedure. (*) Depending on surface porosity 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 (180°, 30 min., stainless steel)
Resistance to shear	FTM 8	150 h (1 kg / 25 mm x 25 mm)
Application temperature	---	5 °C to 35 °C
Service temperature	---	- 40 °C to 70 °C
Shelf-life storage below 25 °C, dry and sunlight protected	---	24 months
FTM = FINAL Test Method. MD = Longitudinal direction. TD = Transversal direction.		

A2.2 SOLTEC Panel-Fix®

Information included in tables A2.5 to A2.8 has been taken from the technical data sheets of the adhesive system supplier (Adhesivos Soltec SL).

Table A2.5: SOLTEC Panel-Fix® Adhesive.

Typical Product Data	Reference	Value
Chemical base	---	1-component elastomeric adhesive, based on silane terminated polymer
Colour	---	White; black
Cure mechanism	---	Moisture-curing
Density (uncured)	---	1,32 ± 0,02 kg/l
Sagging	ISO 7390	< 2 mm
Application temperature ambient	---	5 °C to 35 °C
Skin time at 23 °C / 50% RH	---	20 ± 10 min (*)
Cure time at 23 °C / 50% RH	---	≥ 3 mm after 24 h
Tensile strength	ISO 37	3,0 ± 0,3 MPa
Modulus at 100%	ISO 37	Approx. 1,0 MPa
Modulus at break	ISO 37	Approx. 2,3 MPa
Elongation at break	ISO 37	> 350%
Tear propagation resistance	ISO 34	Approx. 10 N/mm
Volume loss	ISO 10563	< 2%
Service temperature	---	- 40 °C to 100 °C
Shelf-life storage between 5 °C and 25 °C	---	12 months
UV Resistance	----	Very good
Shrinkage	EN ISO 10563	Change in volume $\Delta V = - 4,2\%$ (**)
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 A	1,35 kg/l
Tensile elastic modulus	EN ISO 527-3	1,64 MPa
Flow resistance	EN ISO 7390, method A	No flow
Hardness Shore A	EN ISO 868	47
	Internal method IT-20 after ISO 868 (3 seconds)	Approx. 55 after 14 days
Colour	EN ISO 11664-4	White

(*) This time depends on hygrometry and ambient temperature. To ensure a good adhesion, the surface to be bonded should be glued before the product has formed its skin.

(**) The symbol “-“ indicates a decrease of mass or volume.

Table A2.6: SOLTEC Panel-Fix® Primer 451SW.

Typical Product Data	Reference	Value
Chemical base	---	Isocyanate and solvent-based primer
Colour	---	Black
Viscosity (DIN cup Ø4 mm, 100 ml) at 20 °C	---	11 to 14 s
Solid content	EN 827	35-38%
Application temperature	---	5 °C to 35 °C
Application method	---	Felt or foam applicator
Consumption	---	80-100 ml/m ² on glass (*)
Density at 20 °C	---	0,935 ± 0,05 kg/l
Flash-off time	---	15 min. (≥ 20 °C)

Table A2.6: SOLTEC Panel-Fix® Primer 451SW.

Typical Product Data	Reference	Value
		> 15 min. (< 20 °C)
Shelf-life storage between 5 °C and 25 °C, sealed container in dry place	---	12 months (**)
(*) Depending on surface porosity of the cladding element or subframe profile.		
(**) Shelf-life storage between 5 °C and 25 °C after opening are 24 hours		

Table A2.7: SOLTEC Panel-Fix® P202 Adhesion Promoter.

Typical Product Data	Reference	Value
Chemical base	---	Mixture of polysilanes in solution in organic solvents.
Colour	---	Colourless, clear
Viscosity	---	1 mPa·s approx.
Density	---	0,80 kg/l approx.
Solid content	EN 827	97%
Application temperature	---	5 °C to 35 °C
Application method	As a cleaner	---
	As a primer	---
Consumption	---	90 ml/m ²
Flash-off time at 23 °C / 50% RH	---	10 min (*)
Shelf-life storage between 5 °C and 25 °C, sealed container in dry place	---	12 months (**)
(*) Depending on climatic differences.		
(**) Shelf-life storage between 5 °C and 25 °C after opening in well closed original container in dry place is one month.		

Table A2.8: SOLTEC Panel-Fix® C Tape.

Typical Product Data	Reference	Value
Chemical base	---	Closed cell polyethylene foam core.
Colour	---	Anthracite
Section dimension	---	(3 mm ± 10%) x 12 mm
Density	---	0,050 g/cm ³
Tensile strength	ISO 1926	MD: 600 kPa TD: 440 kPa
Elongation at break	ISO 1926	MD: 230 % TD: 200 %
Compressive strength at 10%	ISO 3386-1	36 kPa
Peel adhesion	AFERA 5001	16 ± 1,5 N/25 mm
Resistance to shear	FTM 8	168 h (1 kg)
Application temperature	---	5 °C to 35 °C
Service temperature	---	- 30 °C to 100 °C
Shelf-life storage between 5 °C and 25 °C, dry and sunlight protected	---	12 months
FTM = FINAL Test Method. MD = Longitudinal direction. TD = Transversal direction.		

ANNEX 3: Subframe components

A3.1 Vertical profiles

Table A3.1: Geometric and material properties of the vertical 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}
Profile FTS-503B+-PV-L	40 x 60 x 1,8	Figure A3.1a	dy = 8,68	0,48	177	6,80	2,52
Profile FTS-503B+-PV-T	110 x 60 x 1,8	Figure A3.1b	dy = 11,28	0,82	303	9,13	19,97
Material properties							
Characteristic				Value	Reference		
Material				EN AW-6063	EN 755 EN 1999-1		
Treatment				T66			
Durability class				B			
Specific weight (kg/m ³)				2700			
Elastic limit (MPa)				200			
Elongation (%)				6			
Tensile strength (MPa)				245			
Modulus of elasticity (MPa)				70000			
Poisson coefficient				0,3			
Coefficient of thermal expansion between 50 °C and 100 °C (µm/(m·°C))				23,0			

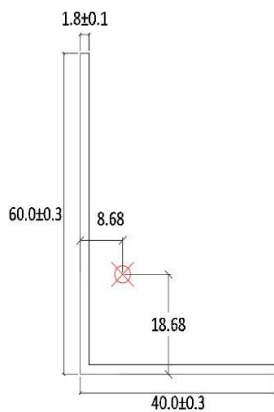


Figure A3.1a: Profile FTS-503B+-PV-L.

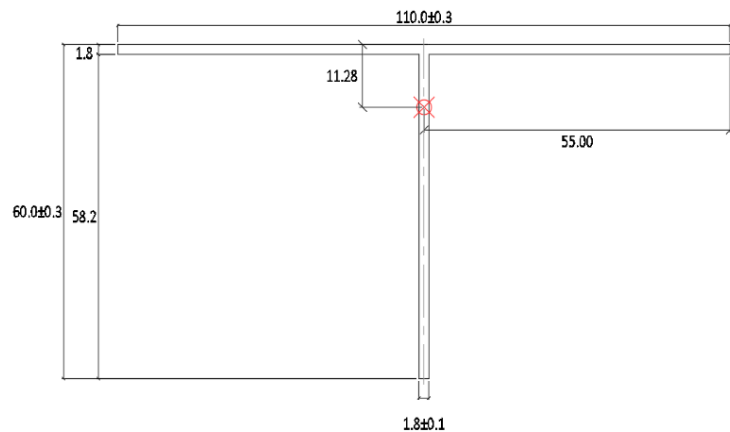


Figure A3.1b: Profile FTS-503B+-PV-T.

A3.2 Supplementary mechanical cladding fixings

Table A3.2: Geometric and material properties of the horizontal profile.

Geometric properties						
Type of profile	Form and dimensions (mm)	Figure	Weight per linear metre (kg/m)	Cross section (mm ²)	Inertia of profile section (cm ⁴)	
					I _{xx}	I _{yy}
Start profile FTS-503B+-PH-L	8 x 60 x 3,0	Figure A3.2a	0,49	180	6,4	0,033
Intermediate profile FTS-503B+-PH-L	8 x 60 x 3,0	Figure A3.2b	0,48	180	5,7	0,037
Material properties						
Characteristic	Value		Reference			
Material	EN AW-6063		EN 755 EN 1999-1			
Treatment	T66					
Durability class	B					
Specific weight (kg/m ³)	2700					
Elastic limit (MPa)	200					
Elongation (%)	6					
Tensile strength (MPa)	245					
Modulus of elasticity (MPa)	70000					
Poisson coefficient	0,3					
Coefficient of thermal expansion between 50 °C and 100 °C (µm/(m·°C))	23,0					

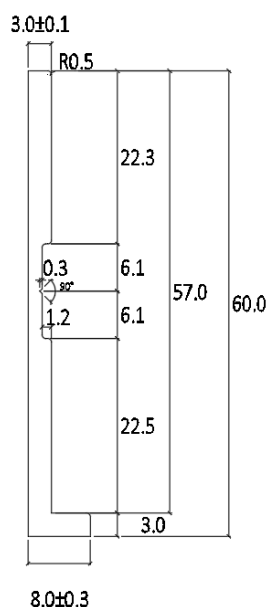


Figure A3.2a: Start profile FTS-503B+-PH-L.

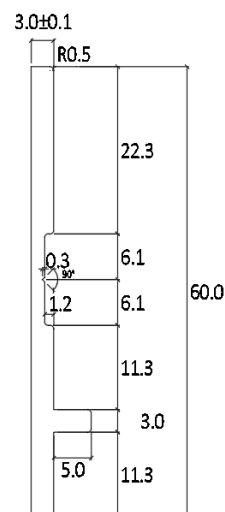


Figure A3.2b: Intermediate profile FTS-503B+-PH-L.

A3.3 Brackets

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

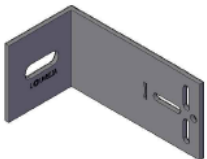


Geometric properties			
Type of bracket		Form and dimensions (mm)	Mass per unit(kg)
Height 60 	60 x L x 60 x 3,0	L = 60	0,051
		L = 80	0,060
		L = 100	0,070
		L = 120	0,080
		L = 140	0,090
	60 x L x 60 x 4,0	L = 160	0,100
		L = 180	0,109
		L = 200	0,158
		L = 220	0,171
		Figure A3.3a	
Height 120 	120 x L x 60 x 3,0	L = 60	0,099
		L = 80	0,119
		L = 100	0,138
		L = 120	0,158
		L = 140	0,177
	120 x L x 60 x 4,0	L = 160	0,197
		L = 180	0,216
		L = 200	0,313
		L = 220	0,339
		Figure A3.3b	
Height 180 	180 x L x 60 x 3,0	L = 60	0,154
		L = 80	0,183
		L = 100	0,212
		L = 120	0,241
		L = 140	0,270
	180 x L x 60 x 4,0	L = 160	0,300
		L = 180	0,328
		L = 200	0,475
		L = 220	0,514
		Figure A3.3c	
Material properties			
Characteristic	Value	Reference	
Material	EN AW-6063	EN 755 EN 1999-1	
Treatment	T5		
Durability class	B		
Specific weight (kg/m ³)	2700		
Elastic limit (MPa)	130		
Elongation (%)	6		
Tensile strength (MPa)	175		
Modulus of elasticity (MPa)	70000		
Poisson coefficient	0,3		
Coefficient of thermal expansion between 50 °C and 100 °C (µm/(m·°C))	23,0		

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

Geometric properties

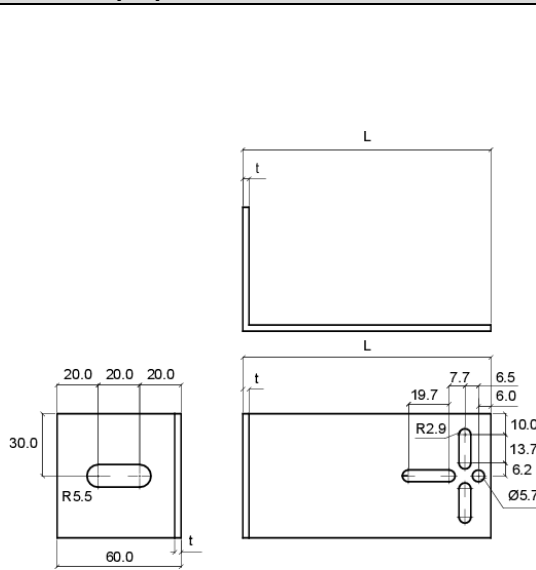


Figure A3.3a: Bracket Height 60.

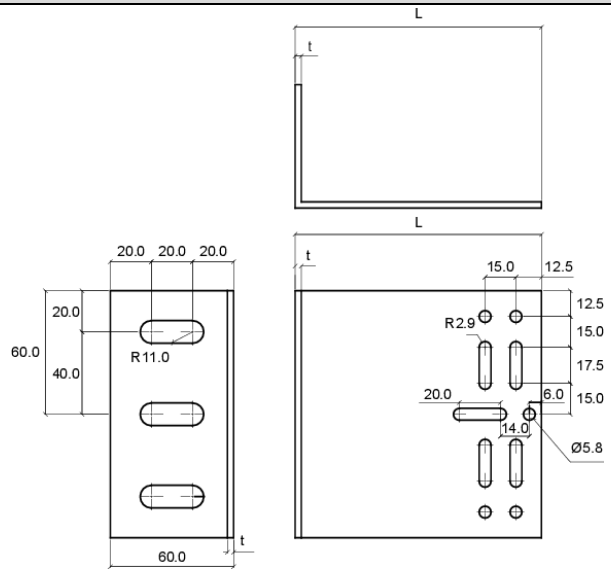


Figure A3.3b: Bracket Height 120.

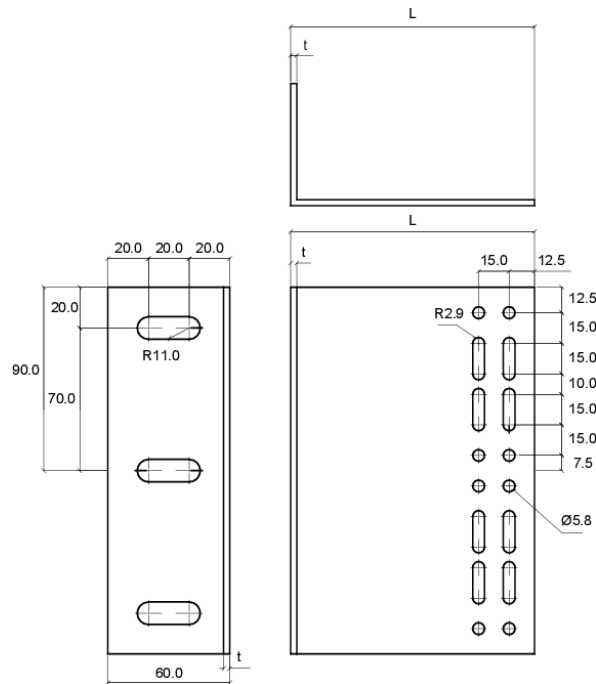


Figure A3.3c: Bracket Height 180.

A3.4 Subframe fixings

Table A3.4: Subframe fixings.

Fixing elements		Geometry		Material		Reference
Position	Type	Dimensions	Type	Class	---	
Between horizontal profiles and vertical profiles	Multi-grip blind rivet	4,0 x 9,5 mm	Aluminium / Stainless steel	---	EN ISO 14588	EN ISO 15974

Between vertical profiles and brackets	Self-drilling screws	5,5 x 22 mm	Stainless steel	A2-70	EN ISO 3506-1	EN ISO 3506-4
					EN ISO 15480	EN ISO 10666

A3.5 Other components

Other products that do not belong to the kit, but they are needed for the execution of the FTS 503B+ kit on-site, 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 wall 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 wall 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 aluminium 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.
- 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, hydrothermal 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 FTS 503B+ kit should consider:

- All the kit components defined in Annexes 2 and 3 may be used.
- 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 FTS 503B+ 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 systems, 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 adhesive systems 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 supplementary mechanical cladding fixings using FTS 503B+ 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.