



Certification Document

Manufacturer:	Kingspan Oy Paroc Panel System Sysilahden teollisuusalue 2 21600 Parainen Finland
Production plant:	Kingspan Oy Paroc Panel System Sysilahden teollisuusalue 2 21600 Parainen Finland
Panel Types:	AST L, AST T, AST S, AST F, AST E with steel faces and mineral wool core material
Date of issuing:	2021-02-18
Date of expiry:	2027-02-18
Certification Number:	07-01-01-02-0026

The Quality Label EPAQ shall be used only in combination with this certification number.

This Certification Document consists of 11 pages.

This Certification Document is only valid in combination with the valid accompanying Quality Certificate. The Quality Certificate is awarded only after the first External Quality Control (EQC), if the requirements of this Certification Document are fulfilled.

European Association for Panels and Profiles

1 GENERAL

This Certification Document (CD) specifies all characteristics of panel types AST L, AST T, AST S, AST F, AST E, which must be declared according to EN 14509. Additionally to the requirements of EN 14509, ZA2 for the mechanical resistance and thermal performance, the EPAQ system A applies. All reports of the initial inspection and continuous surveillance have to be sent also to the association.

2 SANDWICH PANEL TYPES AND DEFINITION OF USED MATERIALS

2.1 Panel types

The sandwich panels of type AST L, AST T, AST S, AST F, AST E consist of mineral wool core material according to Table 1 in between steel faces, with a panel width of 1196 mm and panel thicknesses within the range 50 ÷ 300 mm as specified in Table 4. The geometry of the panels is displayed in Figure 1. The dimensions of the panels shall be within the tolerances given in Figure 1 of this CD, in EN 14509, Annex D and in the Quality Regulations for Panels and Profiles of PPA-Europe, Table 2.3. The faces are flat or quasi-flat, made out of steel sheets according to chapter 2.2.1.

The sandwich panels are intended to be used as self-supporting interior wall and exterior wall panels for use in internal walls and external walls. The panels AST E are intended to be used also as roof panels.

Table 1: Panel types and mineral wool core types

Sandwich panel type	Mineral wool core type	Density of the core [kg/m ³]	Thermal conductivity $\lambda_{\text{declared}}$ [W/(m·K)]
AST L	CES40CS45	70 ⁻⁶⁺⁷	0,038
AST T	CES 35C	75 ± 8	0,039
AST S	CES 50C	85 ± 10	0,040
AST F	CES 50F	115 ± 10	0,045
AST E	CES 75F	120 ± 12	0,045

2.2 Characteristics and composition

2.2.1 Faces

The faces are made out of steel sheets with the following characteristics:

- 0.50, 0.55, 0.60 or 0.70 mm thick organic coated galvanized steel S280GD or S320GD according to EN 10346 or
- 0.60 or 0.70 mm thick stainless steel 1.4301 or 1.4404 according to EN 10088-4 or 1.4622 according to EN 10028-7.

Organic protective coatings shall be selected according to their durability in the application environment. The faces shall have backside coating on the side of the adhesive. The backside coating system shall fulfil at least the requirements of the CPI2 corrosion protection category in EN 10169.

The thickness of the galvanised steel sheets for the faces has to be within the special tolerances given in EN 10143.

2.2.2 Core material

The core consists of structural stone wool plates produced by the company Paroc Oy Ab, Finland. The plates are cut in lamellas. These turned and closely arranged lamellas build the core of the sandwich panels. The declared value of the thermal conductivity for each type of mineral wool core material is given in Table 1.

The core material shall fulfil the reaction to fire requirements of class A1 according to EN 13501-1.

2.2.3 Adhesive

The mineral wool lamellas according to chapter 2.2.2 are bonded to the faces using the polyurethane adhesive systems:

- "Macroplast UK 8573+UK 5400" from the company Henkel with an amount of $275 \pm 40 \text{ g/m}^2$ per side or
- "Kestopur A2S 180 + hardener Kestopur 200 S" from the company Kilito with an amount of 230 up to 300 g/m^2 per side.

The values given in this CD are only valid for the formulation on which the type testing has been performed.

2.2.4 Sandwich panels

The sandwich panels consist of a core according to chapter 2.2.2 and faces according to chapter 2.2.1. The mass of the panels, determined by the manufacturer, is given in table 12. The core material has to fulfil the requirements of the production control according to Table 5. The sandwich panels have to be produced on a semi-continuous line.

The thermal transmittance (U-values) shown in Table 4 are based on the design value of the thermal conductivity without national safety factors $\lambda_{\text{design}} = 1,0 * \lambda_{\text{declared}}$.

3 MATERIAL SAFETY FACTORS AND WRINKLING STRESSES

For design procedure of EN 14509, appendix E, the material safety factors for the ultimate limit state and for the serviceability limit state shall be used according to Table 6 and the wrinkling stresses according to Tables 8, 9, 10 and 11 of this CD. The long term shear values for AST E shall be used according to Table 7. The bending moment capacity shall be calculated by the help of EN 14509, Annex E, Tables E.10.1 and E.10.2.

Panels with stainless steel faces have no values for the wrinkling stresses at a central support. Therefore, these panels can only be used as single span panels.

4 BENDING MOMENT CAPACITY

For bending moment capacities, no values are given, because these values are not needed in any case for design according to the normative Annex E of EN 14509. Bending moment capacities on the basis of full scale tests are dependent on the span and the static systems and do not take into account any effects due of temperature and creeping. Design with these values is therefore not possible on the stage of the valid EN 14509.

5 REACTION TO FIRE AND EXTERNAL FIRE PERFORMANCE

Table 2a: Reaction to fire classification of the sandwich panels with organic coated galvanized steel faces and core types given in Table 1

Panel type	Thickness [mm]	Base metal thickness [mm]		Classification	Remark
		inner face	outer face		
AST L	80 - 300	0,50 – 0,70	0,50 – 0,70	A2-s1,d0	oc* ≤ 4MJ/m ²
AST T	50 – 240	0,50 – 0,70	0,50 – 0,70	A2-s1,d0	oc* ≤ 4MJ/m ²
AST S, AST F, AST E	50 – 300	0,50 – 0,70	0,50 – 0,70	A2-s1,d0	oc* ≤ 4MJ/m ²
AST T	50 – 240	0,50 – 0,70	0,50 – 0,70	C-s1,d0	oc* ≤ 5,1MJ/m ²
AST S, AST F, AST E	50 – 300	0,50 – 0,70	0,50 – 0,70	C-s1,d0	oc* ≤ 5,1MJ/m ²

* oc is the abbreviation for the PCS value of the organic coating

Table 2b: Reaction to fire classification of the sandwich panels with stainless steel faces and core types given in Table 1

Panel type	Thickness [mm]	Base metal thickness [mm]		Classification	Remark
		inner face	outer face		
AST L	80 - 300	0,60 – 0,70	0,60 – 0,70	A2-s1,d0	oc ¹⁾ ≤ 4MJ/m ²
AST T	50 – 240	0,60 – 0,70	0,60 – 0,70	A2-s1,d0	oc ¹⁾ ≤ 4MJ/m ²
AST S, AST F, AST E	50 – 300	0,60 – 0,70	0,60 – 0,70	A2-s1,d0	oc ¹⁾ ≤ 4MJ/m ²

1) Stainless steel faces have a reverse side coating (primer + Epoxy 5-7 µm) on the side of the adhesive; oc is the abbreviation for the PCS value of the organic coating on the reverse side

Table 3: Valid field of application for the classification given in Table 2a and Table 2b

Parameter	Valid field of application
Metal facings	
Grade of metal	Carbon steel: S280GD or S320GD Stainless steel 1.4301 or 1.4404 or 1.4622
Profile geometry of inside facing flat or light profiling up to 5 mm	Line 200, Line 150, Line 600, Smooth, Micro, Shadow
Surface coating – tested face – PCS	Valid for all coatings with PCS-value in the range of 0 to 4,0 MJ/m ² . For coatings with a PCS-value in the range of 0 to 5,1 MJ/m ² , the classification is C-s1,d0.
Colour of coating	Valid for all colours
Joint design	
Joint design	Valid for: standard joint, shadow joint
Seals and gaskets (integral with panel)	Valid for O-seal EPDM Cell, 29,9 MJ/kg, external diameter 8,5 mm, thickness 1,8 mm, weight about 15,5 g/m
Insulating core	
PCS value of mineral wool core	CES40CS45: ≤ 1,6MJ/kg CES 35C, CES 50C, CES 50F, CES 75F : ≤ 1,5MJ/kg
Density [kg/m ³]	CES40CS45: 70 - ⁺⁷ CES 35C: 75 ± 8 CES 50C: 85 ± 10 CES 50F: 115 ± 10 CES 75F: 120 ± 12
Adhesive	Polyurethane based adhesive (Macroplast UK 8573+UK 5400) between metal facings and insulation core with a PCS value ≤ 11.4 MJ/kg and amount ≤ 315 g/m ² - or - Polyurethane based adhesive (Kestopur A2S 180) between metal facings and insulation core with a PCS value ≤ 12,1 MJ/kg and amount ≤ 300 g/m ²
Application	
Orientation of panels, vertical or horizontal application of sandwich panels	Valid for vertically and horizontally installed panels and ceiling application
Metal corner flashings	Steel corner flashing with thickness of at least 0,5 mm and width at least 50 mm with coatings with PCS-value in the range 0 to 4 MJ/m ²
Plastic corner flashings	Not valid for plastic corner flashings
Fixings for metal flashings	Valid for fixing spacing of 400 mm or less
Seals which are applied in end use but not part of the manufactured panel	Not valid for seals which are applied in end use but not part of the manufactured panel

6 FIRE RESISTANCE

NPD

7 DURABILITY

NPD

8 WATER PERMEABILITY

NPD

9 AIR PERMEABILITY

NPD

10 WATER VAPOUR PERMEABILITY

NPD

11 AIRBORNE SOUND PERMEABILITY

NPD

12 SOUND ABSORPTION

NPD

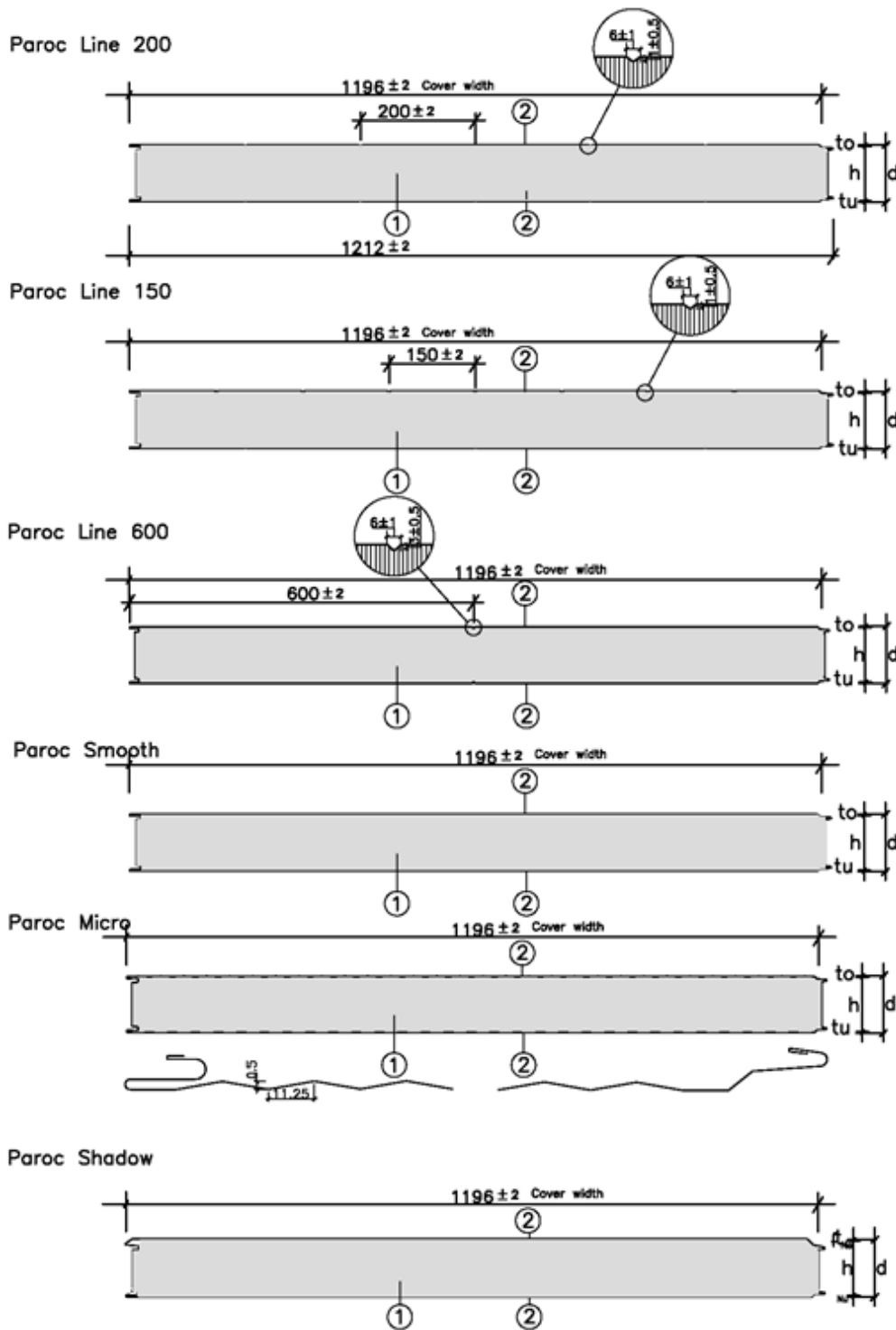
13 WALKABILITY

NPD

Table 4: Thermal transmittance U-values [W/m²K]

Panel type	AST L	AST T	AST S	AST F and AST E
Panel thickness class D [mm]	U-value [W/m²K]	U-value [W/m²K]	U-value [W/m²K]	U-value [W/m²K]
50	-	0,68	0,69	0,77
80	0,45	0,47	0,48	0,53
100	0,37	0,38	0,38	0,43
120	0,30	0,31	0,32	0,36
150	0,24	0,25	0,26	0,29
175	0,21	0,22	0,22	0,25
200	0,18	0,19	0,19	0,22
240	0,15	0,16	0,16	0,18
300	0,12	-	0,13	0,14

Figure 1: Cross-section of panel type AST L, AST T, AST S, AST F and AST E



- (1) Stone wool CES 35C
 thickness class 50 80 100 120 150 175 200 240 - [mm]
 nom. thickness $h=$ 53 79 99 120 151 173 202 243 - [mm]
 Stone wool CES 50C, CES 50F, CES 75F
 thickness class 50 80 100 120 150 175 200 240 300 [mm]
 nom. thickness $h=$ 53 79 99 120 151 173 202 243 305 [mm]
 Stone wool CES40CS45
 thickness class - 80 100 120 150 175 200 240 300 [mm]
 nom. thickness $h=$ - 79 99 120 151 173 202 243 305 [mm]
- (2) Steel faces \geq S280GD + Z, nominal thickness 0.50, 0.55, 0.60, 0.70 [mm] or
 stainless steel faces $R_{p0.2} > 280$ MPa: 1.4301, 1.4404 and 1.4622, nominal thickness 0.60 mm or 0.70 [mm].
 The faces can be combined individually.

**Table 5: Requirements for the production control of the core material with faces
(mechanical values)¹**

Panel type	AST L	AST T	AST S	AST F	AST E
Panel thickness [mm]	79 ± 1 to 305 ± 1	53 ± 2 to 243 ± 3	53 ± 2 to 305 ± 3	53 ± 2 to 305 ± 3	53 ± 2 to 305 ± 3
Core type	CES40CS 45	CES 35 C	CES 50 C	CES 50 F	CES 75 F
Density of the core [kg/m ³]	70.6 ⁺⁷	75 ± 8	85 ± 10	115 ± 10	120 ± 12
Shear modulus: G _C [MPa] mean value ¹⁾					
thickness class 50 mm	-	4,0	6,0	7,0	9,0
thickness class 80 mm	2.7	4,0	6,0	7,0	9,0
thickness class 150 mm	2.7	4,0	6,0	7,0	9,0
thickness class 240 mm	2.7	4,0	6,0	7,0	9,0
thickness class 300 mm	2.7	-	3,6	5,7	6,4
5% fractile value ¹⁾					
thickness class 50 mm	-	2,8	3,9	5,3	6,0
thickness class 80 mm	2.3	2,8	3,9	5,3	6,0
thickness class 150 mm	2.3	2,8	3,9	5,3	6,0
thickness class 240 mm	2.3	2,8	3,9	5,3	6,0
thickness class 300 mm	2.3	-	3,2	4,8	5,4
Shear strength: f _{Cv} [MPa]		0,04	0,06	0,08	0,09
thickness class 80 mm	0,054				
thickness class 150 mm	0,047				
thickness class 300 mm	0,039				
Compressive modulus: E _{Cc} [MPa] 5% fractile value	If the wrinkling stress and ultimate bending moment are controlled at least once per week then there is no requirement to control the tension and compression moduli.				
Cross panel tensile modulus: E _{Ct} [MPa] 5% fractile value					
Compressive strength: f _{Cc} [MPa]		0,045	0,06	0,09	0,11
thickness class 80 mm	0,057				
thickness class 150 mm	0,051				
thickness class 300 mm	0,047				
Cross panel tensile strength: f _{Ct} [MPa]	0,12	0,11	0,16	0,18	0,23
Wrinkling stresses [MPa] ¹⁾					
thickness class 50 mm	-	85	115	140	165
thickness class 80 mm	103	85	115	140	165
thickness class 150 mm	100	85	115	140	165
thickness class 240 mm	90	85	115	140	165
thickness class 300 mm	83	-	100	125	150

¹⁾ Values for intermediate panel thicknesses can be obtained by interpolation.

Table 6: Material safety factors γ_M for sandwich panels

Property to which γ_M applies	Ultimate limit state					Serviceability limit state	
	AST L	AST T	AST S	AST F	AST E	AST L	others
Yielding of a face	1.1					1.0	
Wrinkling of a face in the span and at an intermediate support thickness class 300 mm	1.21 1.21	1.33	1.22 1.30	1.16 1.26	1.18 1.35	1.05	1.09
Shear of the core	1.12	1.29	1.29	1.29	1.29	1.02	1.08
Crushing of the core	1.18	1.31	1.31	1.31	1.31	1.04	1.08

Table 7: Long term shear values – only AST E

Panel thickness [mm]	Long term shear strength: f_c [MPa]	Creep coefficient φ_t	
		t = 2000 h	t = 100000 h
50 to 300	0,045	0,50	0,86

Table 8: Wrinkling stresses (MPa) for external faces from S280GD or S320GD

Geometry of the faces	Face thickness t_N [mm]	Panel thickness [mm]	in span	Wrinkling stress [MPa]		
				in span, elevated temperature	at central support	at central support, elevated temperature
AST L all faces	0,50 - 0,70	80	103	103	67	67
		150	100	100	50	50
		300	83	83	29	29
AST T all faces	0,50 - 0,70	50	85	85	59	59
		150	85	85	60	60
		240	85	85	48	48
AST S all faces	0,50 - 0,70	50	115	115	80	80
		150	115	115	68	68
		240	115	115	57	57
		300	100	100	-	-
AST F all faces	0,50 - 0,70	50	140	140	98	98
		150	140	140	83	83
		240	140	140	70	70
		300	125	125	-	-
AST E all faces	0,50 - 0,70	50	165	134	115	93
		150	165	165	98	98
		240	165	165	82	82
		300	150	150	-	-

Table 9: Wrinkling stresses (MPa) for internal faces from S280GD or S320GD

Geometry of the faces	Face thickness t_N [mm]	Panel thickness [mm]	Wrinkling stress [MPa]	
			in span	at central support
AST L all faces	0,50 - 0,70	80	103	98
		150	100	65
		300	83	37
AST T all faces	0,50 - 0,70	50	85	83
		150	85	81
		240	85	57
AST S all faces	0,50 - 0,70	50	115	92
		150	115	82
		240	115	74
		300	100	-
AST F all faces	0,50 - 0,70	50	140	112
		150	140	100
		240	140	90
		300	125	-
AST E all faces	0,50 - 0,70	50	165	132
		150	165	118
		240	165	105
		300	150	-

Table 10: Wrinkling stresses (MPa) for external faces from stainless steel

Geometry of the faces	Face thickness t_N [mm]	Panel thickness [mm]	in span	Wrinkling stress [MPa]		
				in span, elevated temperature	at central support	at central support, elevated temperature
AST L all faces	0,60 - 0,70	80	103	103	-	-
		150	100	100	-	-
		300	83	83	-	-
AST T all faces	0,60 - 0,70	50	85	85	-	-
		150	85	85	-	-
		240	85	85	-	-
AST S all faces	0,60 - 0,70	50	115	115	-	-
		150	115	115	-	-
		240	115	115	-	-
		300	100	100	-	-
AST F all faces	0,60 - 0,70	50	140	140	-	-
		150	140	140	-	-
		240	140	140	-	-
		300	125	125	-	-
AST E all faces	0,60 - 0,70	50	165	134	-	-
		150	165	165	-	-
		240	165	165	-	-
		300	150	150	-	-

Table 11: Wrinkling stresses (MPa) for internal faces from stainless steel

Geometry of the faces	Face thickness t_N [mm]	Panel thickness [mm]	Wrinkling stress [MPa]	
			in span	at central support
AST L all faces	0,60 - 0,70	80	103	-
		150	100	-
		300	83	-
AST T all faces	0,60 - 0,70	50	85	-
		150	85	-
		240	85	-
AST S all faces	0,60 - 0,70	50	115	-
		150	115	-
		240	115	-
		300	100	-
AST F all faces	0,60 - 0,70	50	140	-
		150	140	-
		240	140	-
		300	125	-
AST E all faces	0,60 - 0,70	50	165	-
		150	165	-
		240	165	-
		300	150	-

Table 12: Mass of the panels, based on a standard combination of face thicknesses 0,6 / 0,5 mm

Panel thickness class D [mm]	Mass of the panel [kg/m ²]				
	AST L	AST T	AST S	AST F	AST E
50	-	14	15	16	16
80	15	16	17	19	19
100	17	17	19	21	22
120	18	19	21	24	24
150	21	21	23	27	28
175	22	23	25	30	31
200	24	25	28	33	34
240	27	28	32	38	39
300	31	-	37	45	47

Liability

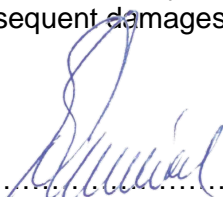
The “European Association for Panels and Profiles” (PPA-Europe) located in Krefeld/Germany certifies and monitors at the wish of the manufacturers the sandwich panels and profiled sheets produced by them and awards the “EPAQ Quality Label” after successful certification.

In doing this, PPA-Europe and its representatives take the statutory regulations and the trust of end users in the certified products very seriously and make use of external experts for the substantive and technical examination of the construction products whose test results are checked once more by PPA-Europe. The same applies for the subsequent monitoring by PPA-Europe.

Nevertheless, it is possible that individual products unintentionally do not fully comply with the high level of quality and may lead to damage to the construction. If, in such a case, a claim is made on the manufacturer due to faulty quality or faulty delivery of the construction products, claims of recourse for this reason on PPA-Europe or its representatives may only be invoked in cases of intentional or grossly negligent behaviour during the certification or monitoring.

The certification and subsequent monitoring executed by PPA-Europe and its representatives does not affect the obligation of the manufacturer for a proper and constant level of quality and standard of the products.

With the exemption of intentional or grossly negligent action on the part of PPA-Europe and its representatives, we are only liable for the direct damage to the construction caused by the faulty product; all further subsequent damages are excluded.



.....
Chairman of the Quality Committee for Panels