DENEY SERTİFİKASI
Test Certificate

TÜRKAK
Test
TS EN ISO/IEC 17025
AB-0531-T

AB-0531-T
020.1585.1/2021
18.05.2021

Façade Testing Institute

Müşterinin Adı ve Adresi / *Customer's Name & Address:* Asist Alüminyum Profil San. ve Tic. A.Ş
Kırklareli OSB No:2 Cad:2 Kırklareli / TÜRKİYE

Numunenin Adı ve Tarifi / *Sample's Name & Description:* FC50-AS Curtain Wall System

Numune Kabul Tarihi / *Acceptence Date of Item:* 06.05.2021 **FTI Proje No** / *FTI Project No:* 2021.1346

Uygulanan Normlar / *Norms Applied:* EN 13830, EN 12153, EN 12155, EN 12179, EN 1026

Sonuçlar / *Results:*

EN 12152 - Air Permeability : Class A4
EN 12207 - Air Permeability : Class 4
EN 12154 - Watertightness (Static) : Class R7
EN 13830 - Resistance to Wind Load : PASS (Criteria L/200) (±900Pa)
EN 13830 - Extreme Load : No damage was observed. (±1350 Pa)

Test Tarihi/ *Date of Test*
11.05.2021

Sayfa Sayısı / *Number of Pages*
1 / 24

Deney laboratuvarı olarak faaliyet gösteren FTI Fasad Teknoloji Merkezi, TÜRKAK 'tan AB-0531-T numarası ile TS EN ISO/IEC 17025 standardına göre akredite edilmiştir.
FTI Facade Testing Institute accredited by TURKAK under registration number AB-0531-T for TS EN ISO/IEC 17025 as test laboratory.

Türk Akreditasyon Kurumu (TÜRKAK) deney laboratuvarlarının tanınırlığı konusunda Avrupa Akreditasyon Birliği (EA) ile Çok Taraflı Anlaşma ve Uluslararası Laboratuvar Akreditasyon Birliği (ILAC) ile karşılıklı tanıma anlaşması imzalamıştır.
Turkish Accreditation Agency (TURKAK) is a signatory to the European co-operation for Accreditation (EA) Multilateral Aggrement (MLA) and to the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognation Arrangement (MRA) for the recognation of test reports.

Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (olması halinde) ve deney metotları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir. Bu sertifika yalnız test edilen numuneye ait sonuçları içerir ve ekte sunulan ilgili test raporu ile birlikte geçerlidir.
The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages. This certificate includes the test results of the specimen which is identified above and its valid with the related test report.

FAÇADE TESTING INSTITUTE

Mühür / *Seal*

Tarih / *Date*
18.05.2021

Hazırlayan / *Prepared by*
Baran ÜREK
Test Mühendisi / Testing Engineer

Onaylayan / *Approved by*
Öner ARSLAN
Laboratuvar Müdürü / Laboratory Manager

FTI Fasad Teknoloji Merkezi / *FTI Façade Testing Institute*
Çakıl Mahallesi Şehit Teğmen Tamer Aydın Sok. No: 76/2 34540 Çatalca / İstanbul / TÜRKİYE
Tel: +90 212 776 42 25 Fax: +90 212 776 40 58-59
mail: info@fti-europe.com

TEST REPORT

Referenced Method : EN 13830 Curtain Walling – Product Standard

Product / Project : FC50-AS Curtain Wall System

Prepared by : Baran ÜREK

1. PREFACE

This report contains the results of performance tests, which were performed by FTI Facade Testing Institute at the address; Çakıl Mah. Şehit Teğmen Tamer Aydın Sok. No: 76/2 34540 Çatalca – Istanbul / TURKIYE.
Test sample FC50-AS Curtain Wall System has been designed and constructed by Asist Aluminyum Profil San. ve Tic. A.Ş
Test sample was prepared at the customer's facilities and delivered to FTI laboratory on 06.05.2021

2. CLIENT

Asist Aluminyum Profil San. ve Tic. A.Ş
Kırklareli OSB No:2 Cad:2
Kırklareli / TÜRKİYE

3. TEST & CLASSIFICATION METHODS

Tests have been carried out and classified according to the standards indicated below.

Document No	Date of Publication	Content of Document
EN 13830:2015+A1	2020	Curtain Walling – Product Standard
EN 12153	2000	Curtain Walling – Air Permeability – Test Method
EN 12152	2002	Curtain Walling – Air Permeability – Performance Requirement and Classification
EN 12155	2000	Curtain Walling – Watertightness – Laboratory Tests Under Static Pressure
EN 12154	1999	Curtain Walling – Watertightness – Performance Requirements and Classification
EN 12179	2000	Curtain Walling – Resistance to Wind Load – Test Method
EN 1026	2016	Windows and doors - Air permeability - Test method
EN 12207	2016	Windows and doors - Air permeability - Classification

4. TEST DATE AND PARTICIPANTS

Tests were performed on 11.05.2021 by the followings:

Öner ARSLAN	FTI	Laboratory Manager
Baran ÜREK	FTI	Testing Engineer
And witnesses;		
İsmail KOÇYİĞİT	Asistal Aluminyum	
Kadir ASLAN	Asistal Aluminyum	

5. DESCRIPTIONS OF TEST SAMPLE

Type of sample	Curtain Wall System
System name	FC50-AS Curtain Wall System
Dimensions of sample	1800 mm x 1800 mm
Surface area of sample	3,24 m^2
Dimensions of operable parts	825 mm x 825 mm
Area of operable parts	0,68 m^2
Total length of operable parts	3,3 m
Fixed joint length	14,40 m
Glass type	6MM Temp DC+12HB+6MM TEMP C

Please refer to detailed drawings presented on pages 16-24 for the system details. Information in the table above, detailed system drawings and information inside have been submitted to FTI Façade Testing Institute under the responsibility of customer.

6. CONDITIONS

Date	:	11.05.2021
Local Temperature (ºC)	:	20
Atmospheric Pressure (mbar)	:	1011
Ambient Humidity (%)	:	56

7. TEST PERFORMANCE

Pressure Sequence

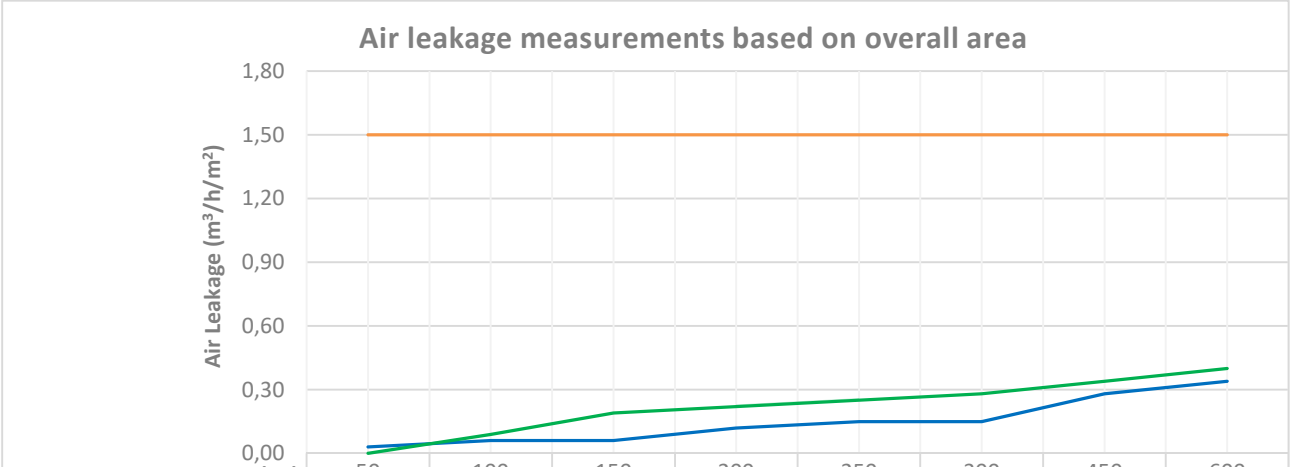
STEPS		POSITIVE PRESSURE (Pa)	NEGATIVE PRESSURE (Pa)
1	PA	600	600
2	PW	600	-
3	PD	900	900
4	PE	1350	1350

PA: Pressure for Airtightness ; PW: Pressure for Watertightness ;

PD: Design Pressure ; PE: Extreme Pressure

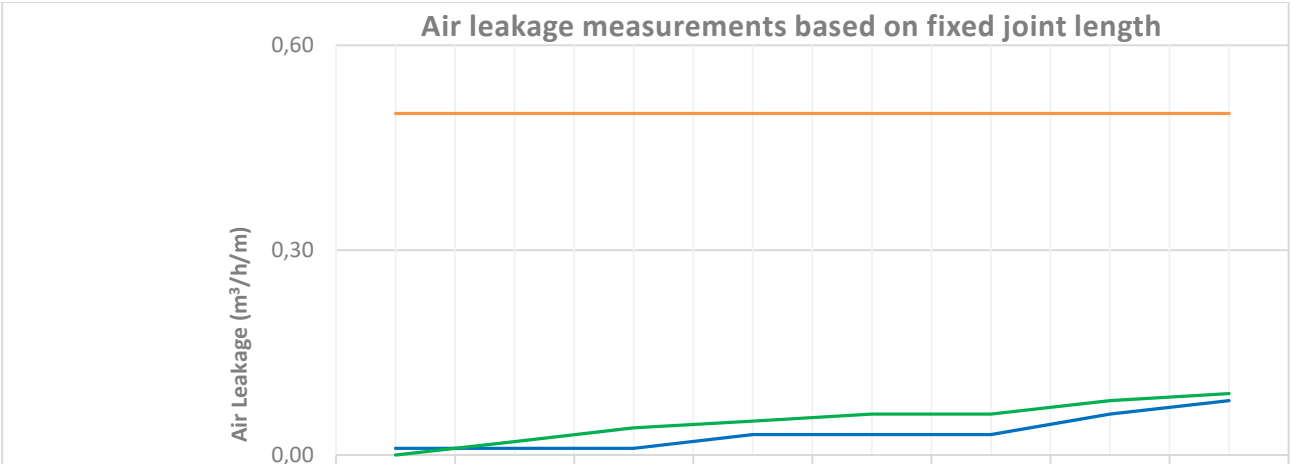
7.1. Air Permeability – EN 12153

Before starting the test, 3 pulses at 660 Pa is applied to the sample. During the tests, the pressure at the following values is applied for 10 seconds. The following data includes the values of the system after tare.



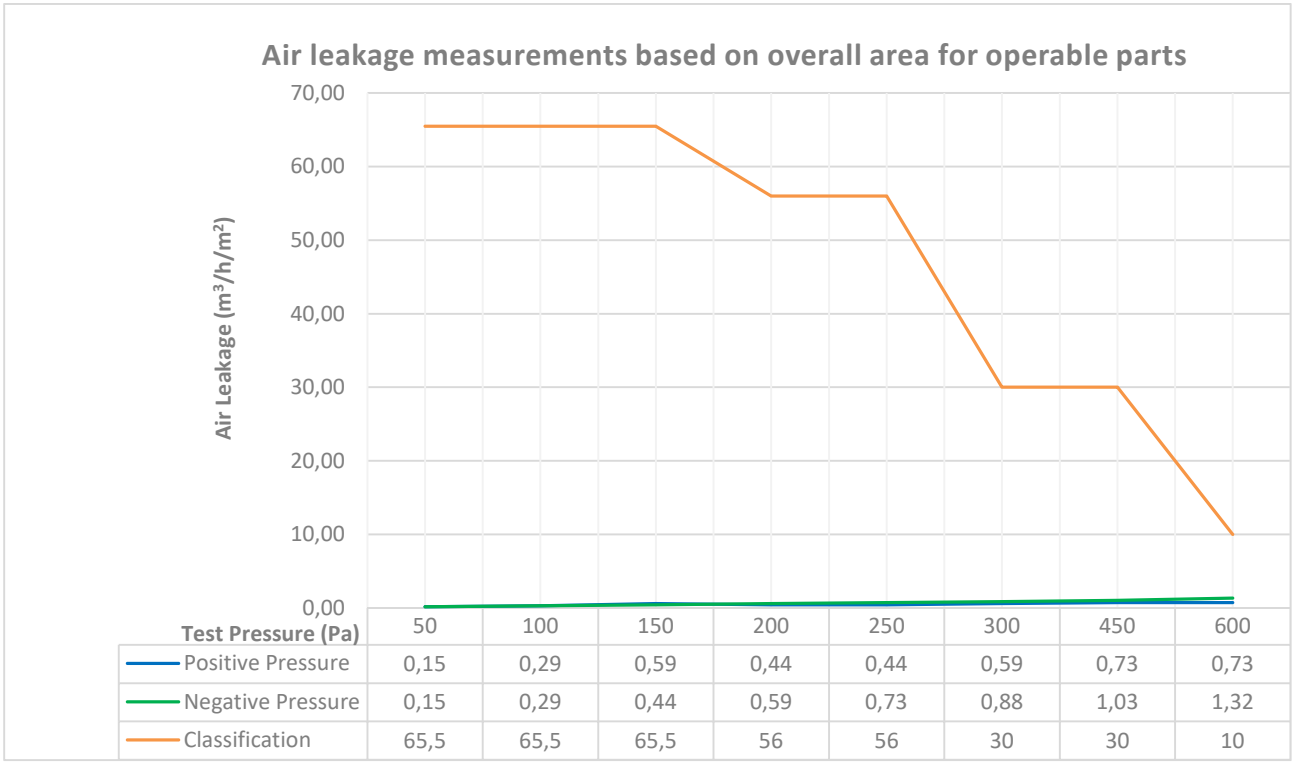
Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,03	0,06	0,06	0,12	0,15	0,15	0,28	0,34
Negative Pressure	0,00	0,09	0,19	0,22	0,25	0,28	0,34	0,40
Classification	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5

***Test No: 2021.1346.12-13** / 07.05.2021 (positive & negative pressure)*



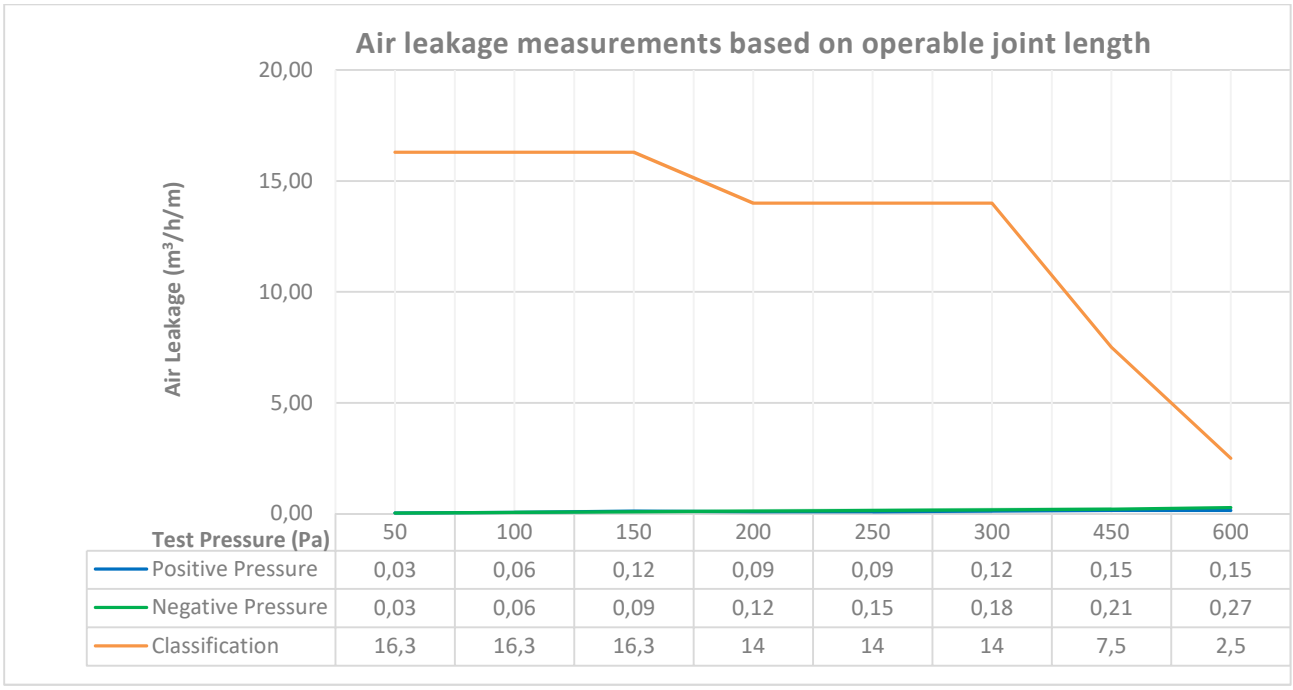
Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,01	0,01	0,01	0,03	0,03	0,03	0,06	0,08
Negative Pressure	0,00	0,02	0,04	0,05	0,06	0,06	0,08	0,09
Classification	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5

***Test No: 2021.1346.12-13** / 07.05.2021 (positive & negative pressure)*



Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,15	0,29	0,59	0,44	0,44	0,59	0,73	0,73
Negative Pressure	0,15	0,29	0,44	0,59	0,73	0,88	1,03	1,32
Classification	65,5	65,5	65,5	56	56	30	30	10

***Test No: 2021.1346.10-11** / 07.05.2021 (positive & negative pressure)*



Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,03	0,06	0,12	0,09	0,09	0,12	0,15	0,15
Negative Pressure	0,03	0,06	0,09	0,12	0,15	0,18	0,21	0,27
Classification	16,3	16,3	16,3	14	14	14	7,5	2,5

***Test No: 2021.1346.10-11** / 07.05.2021 (positive & negative pressure)*

7.2. Watertightness Test Under Static Pressure – EN 12155

Before starting the test, 3 pulses at 660 Pa were applied to the sample. Waiting duration between each impacts were 3 seconds. During the test, the sample was kept under the effect of water spraying, while the pressure values in the table were applied for the specified periods..

The amount of water sprayed to the façade = 2,0 l/ m^2.min x 3,24 m^2 = 6,48 l/min ≈ 388,8 l/hour

Observations

Pressure Value (Pa)	Time Period (min)	Observations
0	15	No water leakage was observed.
50	5	No water leakage was observed.
100	5	No water leakage was observed.
150	5	No water leakage was observed.
200	5	No water leakage was observed.
300	5	No water leakage was observed.
450	5	No water leakage was observed.
600	5	No water leakage was observed.

***Test No: 2021.1346.14** / 07.05.2021*

7.3. Resistance to Wind Load – EN 13830

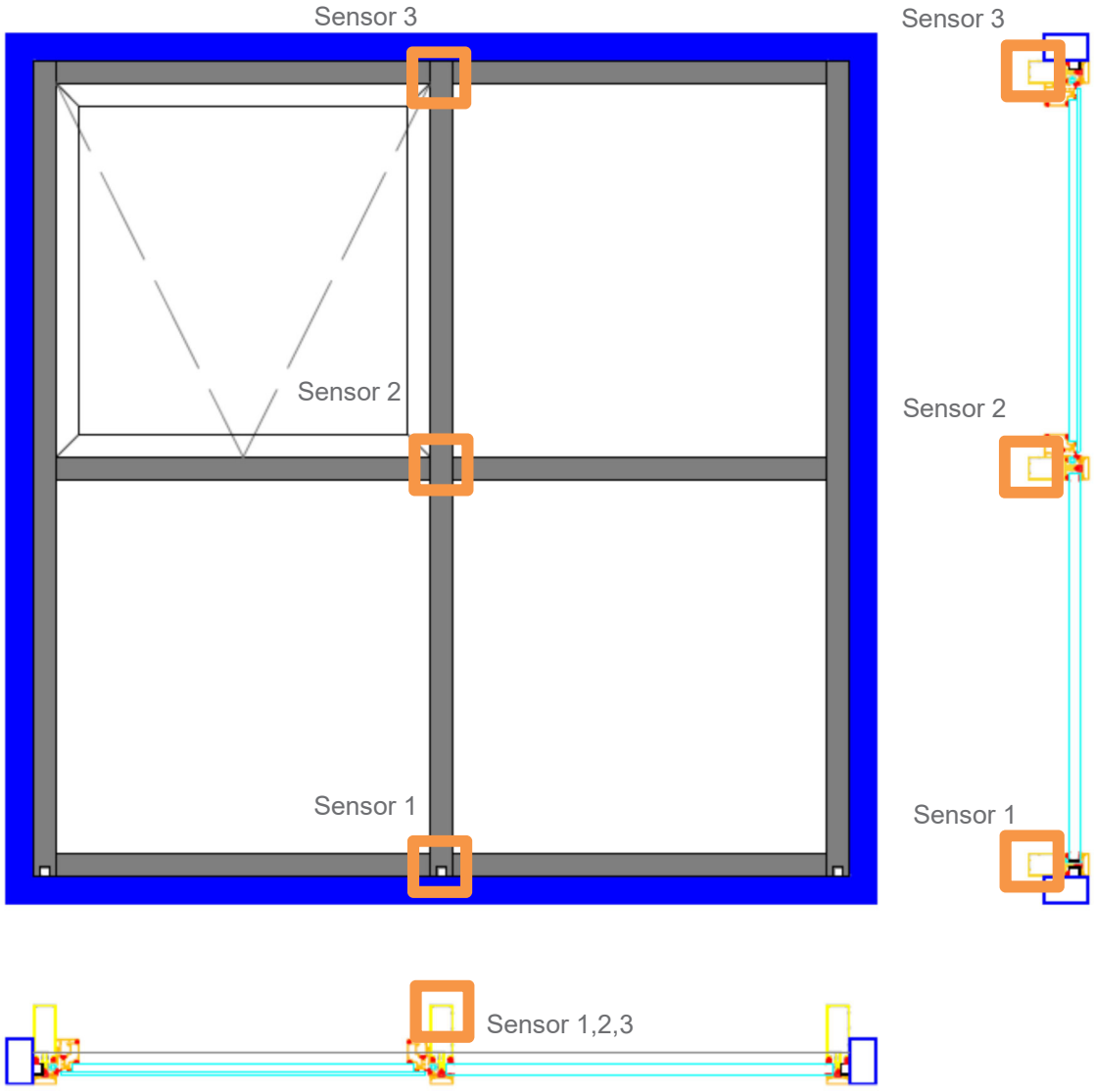
Before starting the test, 3 pulses at 500 Pa were applied to the sample. Waiting duration between each impacts were 3 seconds.

Design load of the specimen is 900 Pa. So, the pressure steps were 225 Pa, 450 Pa, 675 Pa and 900 Pa applied as positive and negative directions and the deflection values arising under the influence of pressure were measured.

Sensor positions: Vertical distance for mullion at middle axis, interstory height **L = 1800 mm**

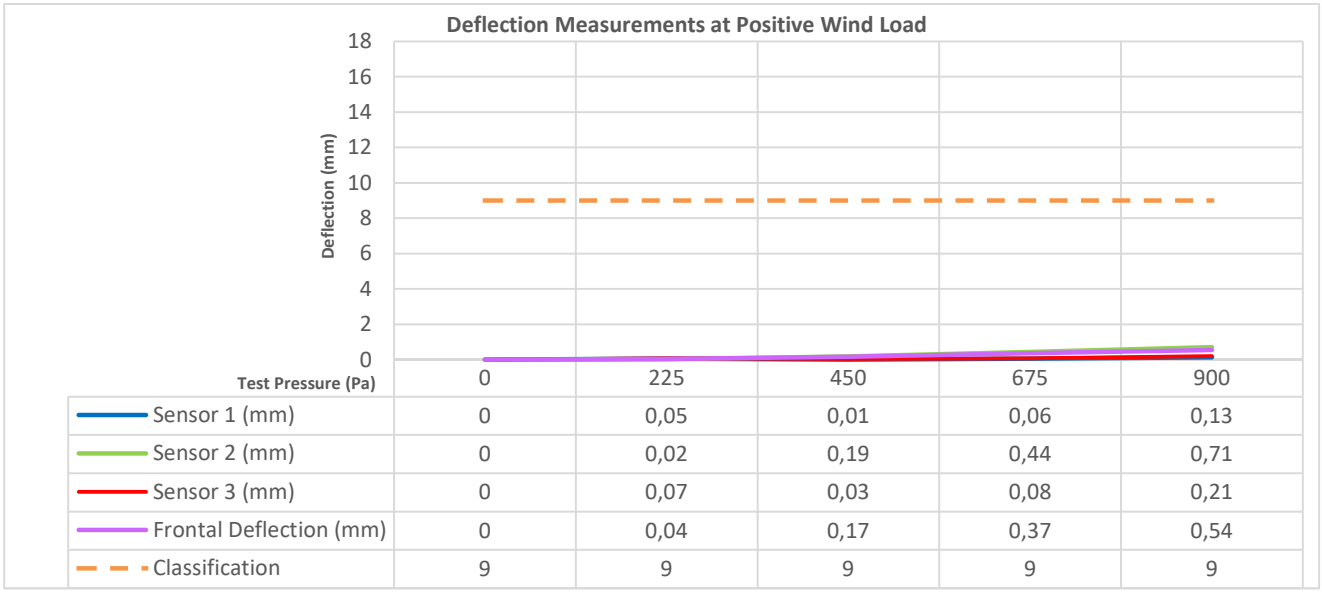
The relative façade deflection (Xp, Xn) measured between the structural support points under positive and negative design loads is evaluated according to the criteria defined in the table below:

EN 13830 – Frontal Deflection Criteria	**Relative Deflection Criteria Depending on the Floor Height:**
☒ $X_p, X_n \leq L/200$, if $L \leq 3000$ mm ☐ $X_p, X_n \leq 5$ mm + L /300, if 3000 mm < L < 7500 mm ☐ $X_p, X_n \leq L/250$, if $L \geq 7500$ mm	d = **9 mm limit value** Frontal deflection value shall be < d limit value



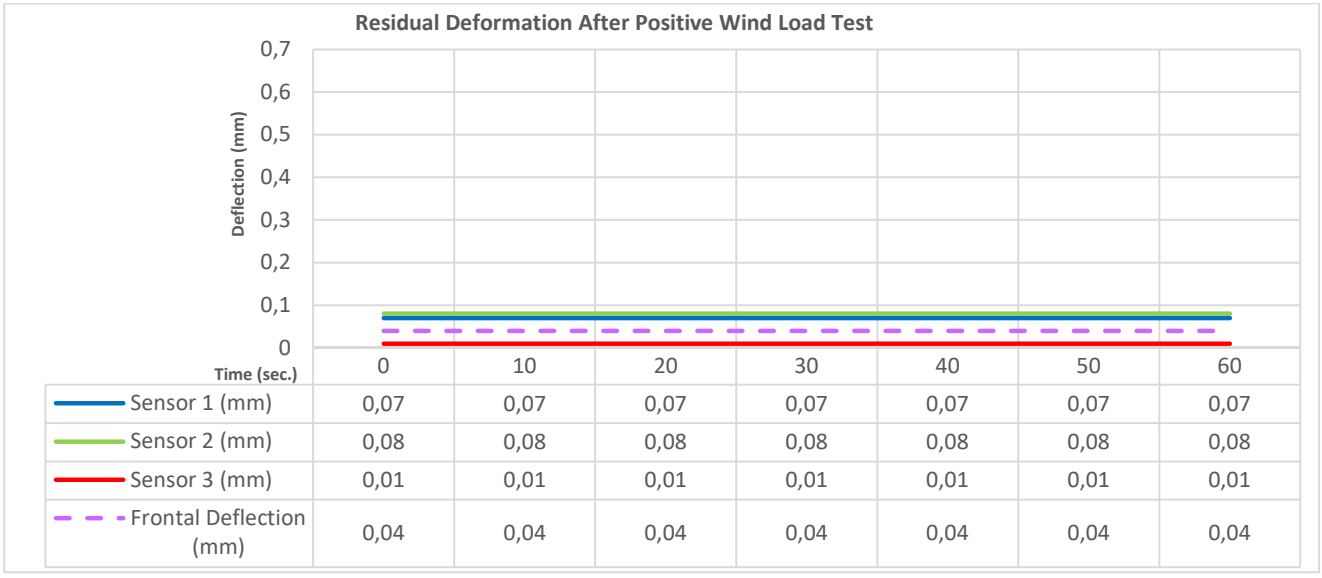
Sensors location on the sample

	X coordinate (mm)	Y coordinate (mm)
External Dimensions	1800	1800
Sensor 1 - Coordinate	900	25
Sensor 2 - Coordinate	900	875
Sensor 3 - Coordinate	900	1775



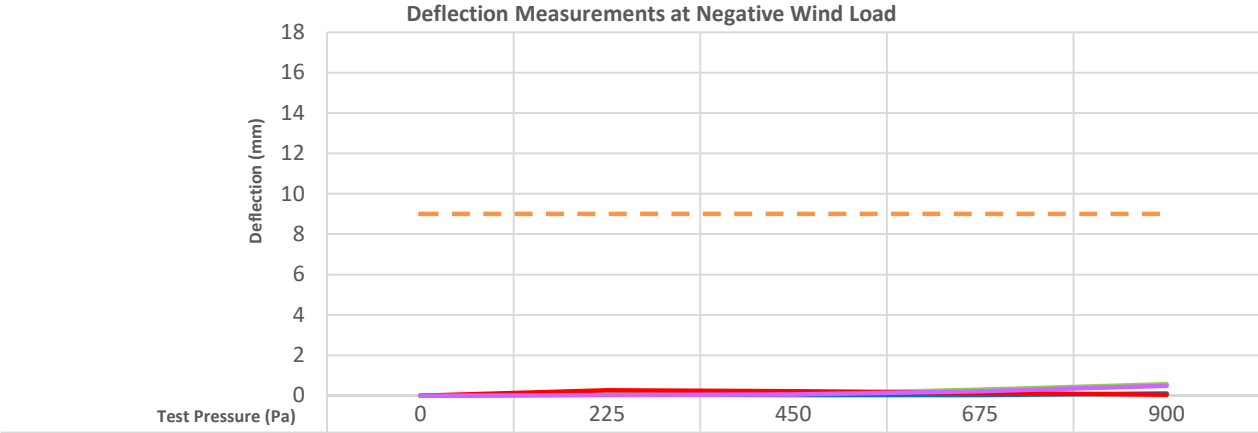
Test Pressure (Pa)	0	225	450	675	900
Sensor 1 (mm)	0	0,05	0,01	0,06	0,13
Sensor 2 (mm)	0	0,02	0,19	0,44	0,71
Sensor 3 (mm)	0	0,07	0,03	0,08	0,21
Frontal Deflection (mm)	0	0,04	0,17	0,37	0,54
Classification	9	9	9	9	9

***Test No: 2021.1346.15** / 07.05.2021*



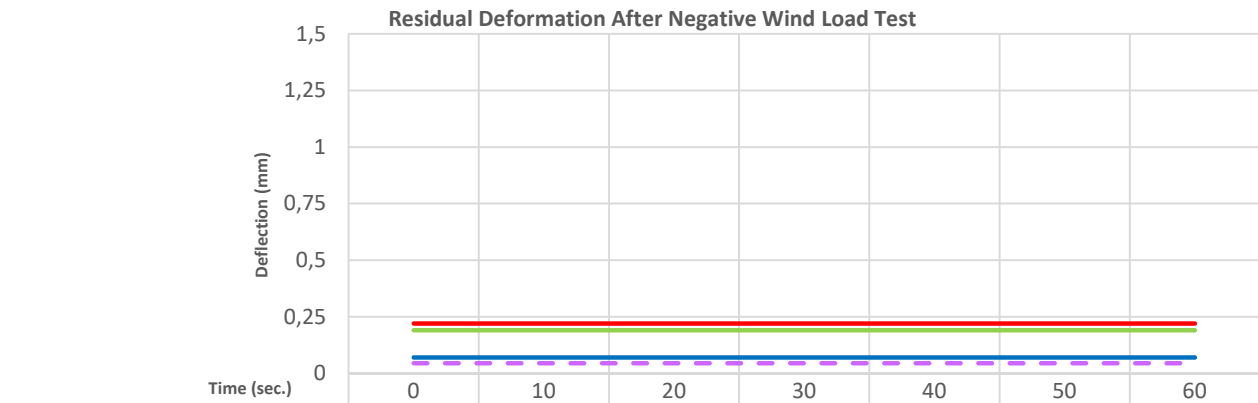
Time (sec.)	0	10	20	30	40	50	60
Sensor 1 (mm)	0,07	0,07	0,07	0,07	0,07	0,07	0,07
Sensor 2 (mm)	0,08	0,08	0,08	0,08	0,08	0,08	0,08
Sensor 3 (mm)	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Frontal Deflection (mm)	0,04	0,04	0,04	0,04	0,04	0,04	0,04

***Test No: 2021.1346.15** / 07.05.2021*



Test Pressure (Pa)	0	225	450	675	900
Sensor 1 (mm)	0	0,06	0,03	0,03	0,11
Sensor 2 (mm)	0	0,14	0,07	0,3	0,57
Sensor 3 (mm)	0	0,27	0,22	0,14	0,04
Frontal Deflection (mm)	0	0,025	0,055	0,215	0,495
Classification	9	9	9	9	9

***Test No: 2021.1346.16** / 07.05.2021*

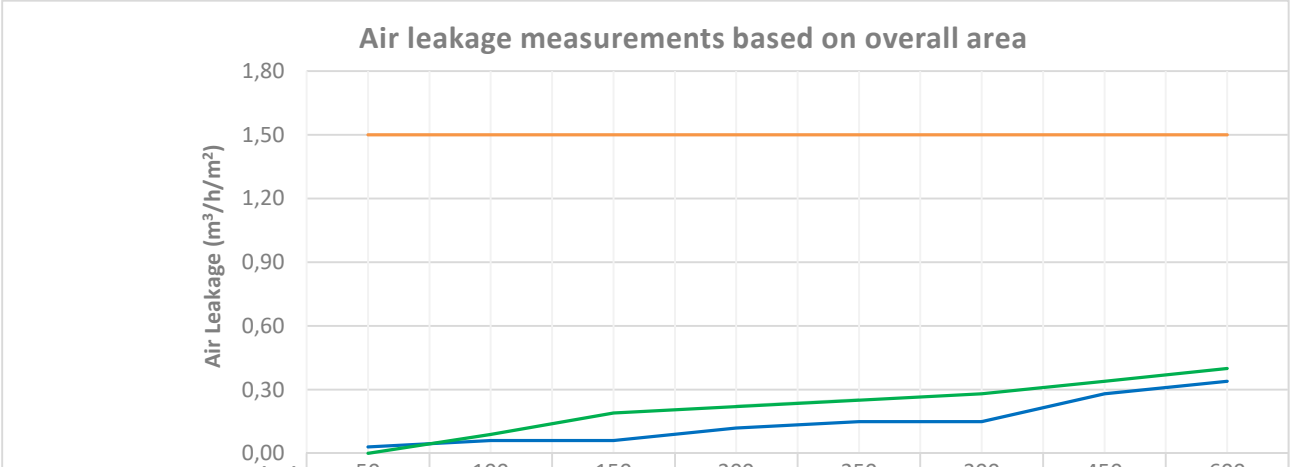


Time (sec.)	0	10	20	30	40	50	60
Sensor 1 (mm)	0,07	0,07	0,07	0,07	0,07	0,07	0,07
Sensor 2 (mm)	0,19	0,19	0,19	0,19	0,19	0,19	0,19
Sensor 3 (mm)	0,22	0,22	0,22	0,22	0,22	0,22	0,22
Frontal Deflection (mm)	0,045	0,045	0,045	0,045	0,045	0,045	0,045

***Test No: 2021.1346.16** / 07.05.2021*

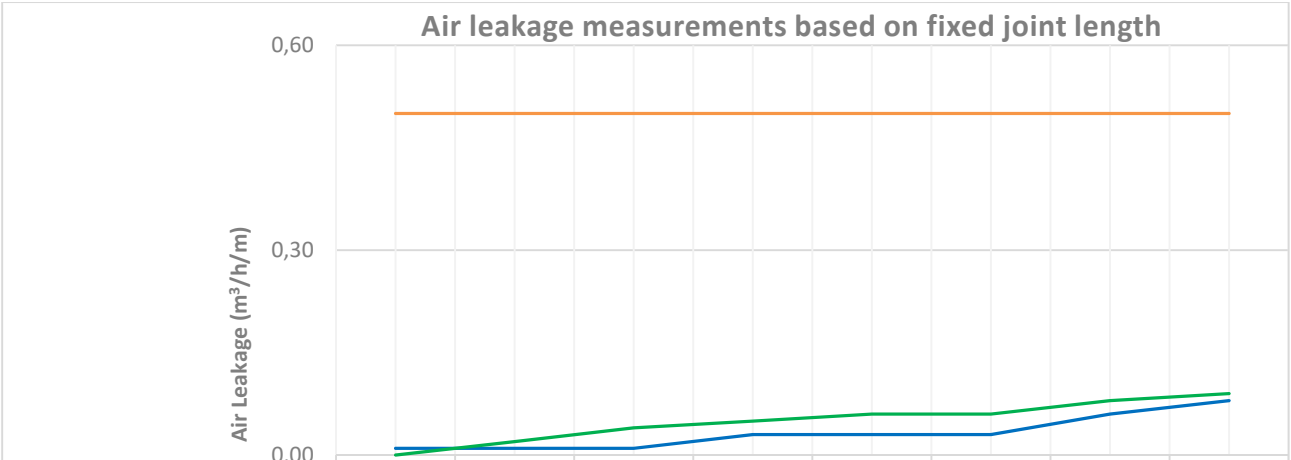
7.4. Air Permeability – EN 12153

Before starting the test, 3 pulses at 660 Pa was applied to the sample. During the tests, the pressure at the following values was applied for 10 seconds. The following data includes the values of the system after tare.



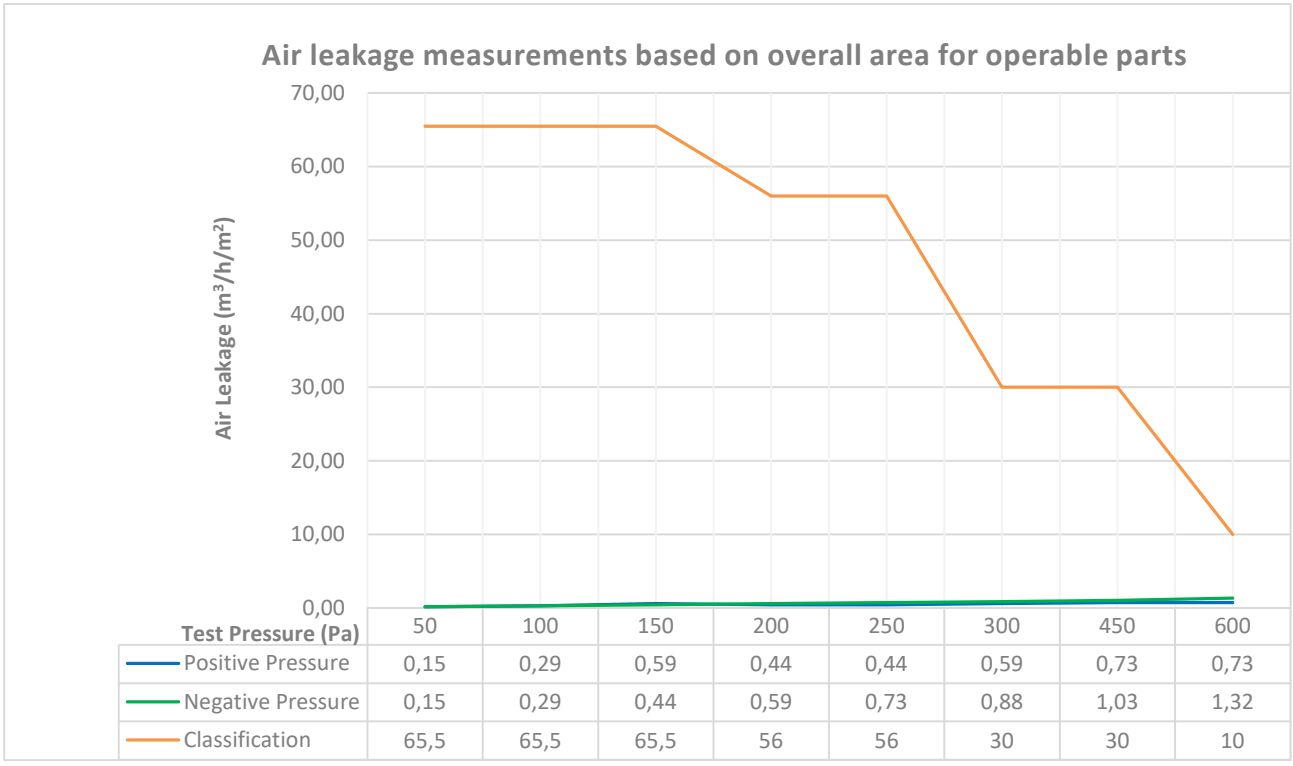
Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,03	0,06	0,06	0,12	0,15	0,15	0,28	0,34
Negative Pressure	0,00	0,09	0,19	0,22	0,25	0,28	0,34	0,40
Classification	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5

***Test No: 2021.1346.17-18** / 07.05.2021 (positive & negative pressure)*



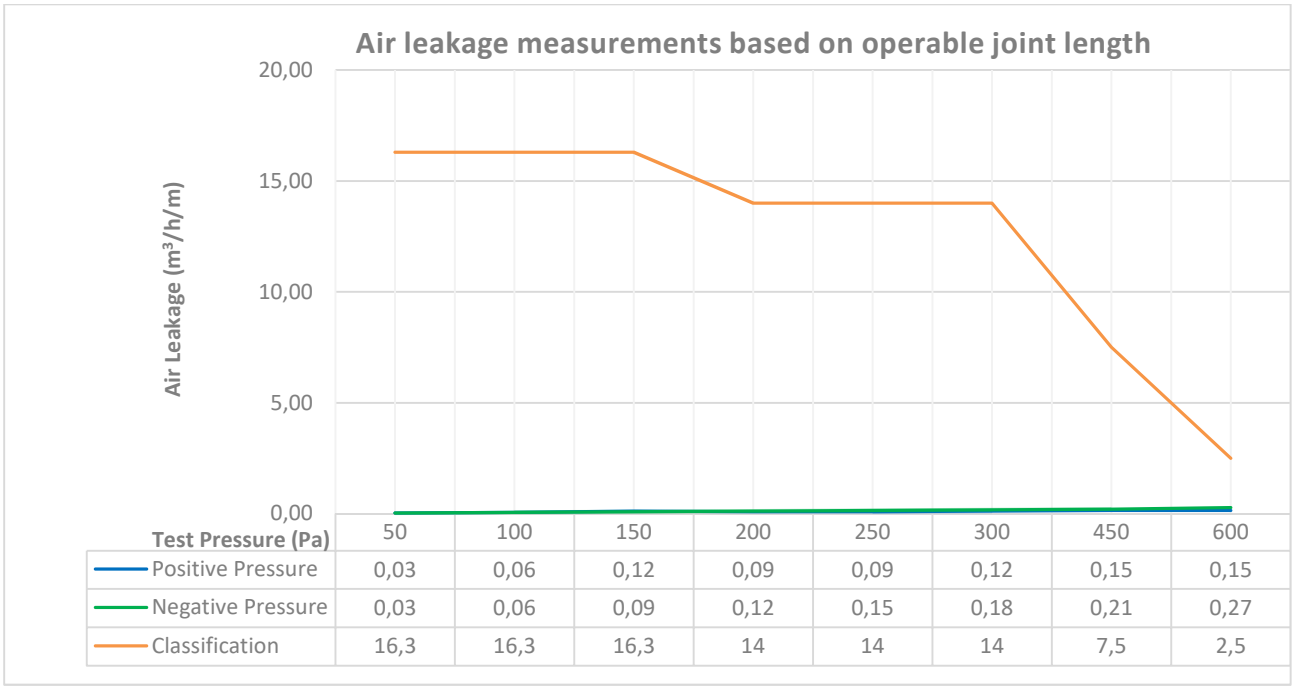
Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,01	0,01	0,01	0,03	0,03	0,03	0,06	0,08
Negative Pressure	0,00	0,02	0,04	0,05	0,06	0,06	0,08	0,09
Classification	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5

***Test No: 2021.1346.17-18** / 07.05.2021 (positive & negative pressure)*



Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,15	0,29	0,59	0,44	0,44	0,59	0,73	0,73
Negative Pressure	0,15	0,29	0,44	0,59	0,73	0,88	1,03	1,32
Classification	65,5	65,5	65,5	56	56	30	30	10

***Test No: 2021.1346.10-11** / 07.05.2021 (positive & negative pressure)*



Test Pressure (Pa)	50	100	150	200	250	300	450	600
Positive Pressure	0,03	0,06	0,12	0,09	0,09	0,12	0,15	0,15
Negative Pressure	0,03	0,06	0,09	0,12	0,15	0,18	0,21	0,27
Classification	16,3	16,3	16,3	14	14	14	7,5	2,5

***Test No: 2021.1346.10-11** / 07.05.2021 (positive & negative pressure)*

7.5. Watertightness Test Under Static Pressure – EN 12155

Before starting the test, 3 pulses at 660 Pa were applied to the sample. Waiting duration between each impacts was 3 seconds. During the test, the sample was kept under the effect of water spraying, while the pressure values in the table were applied for the specified periods..

The amount of water sprayed to the façade = 2,0 l/ m^2.min x 3,24 m^2 = 6,48 l/min ≈ 388,8 l/hour

Observations

Pressure Value (Pa)	Time Period (min)	Observations
0	15	No water leakage was observed.
50	5	No water leakage was observed.
100	5	No water leakage was observed.
150	5	No water leakage was observed.
200	5	No water leakage was observed.
300	5	No water leakage was observed.
450	5	No water leakage was observed.
600	5	No water leakage was observed.

***Test No: 2021.1346.22** / 11.05.2021*

7.6. Extreme Load – EN 12179

The safety load is applied to the sample at 1.5 times of design load.

Test Pressure	Applied		Observations
	Positive (Pa)	Negative (Pa)	
PE =1350 Pa	1350	-	No damage was observed on the sample.
	-	1350	No damage was observed on the sample.

***Test No: 2021.1346.23** / 11.05.2021*

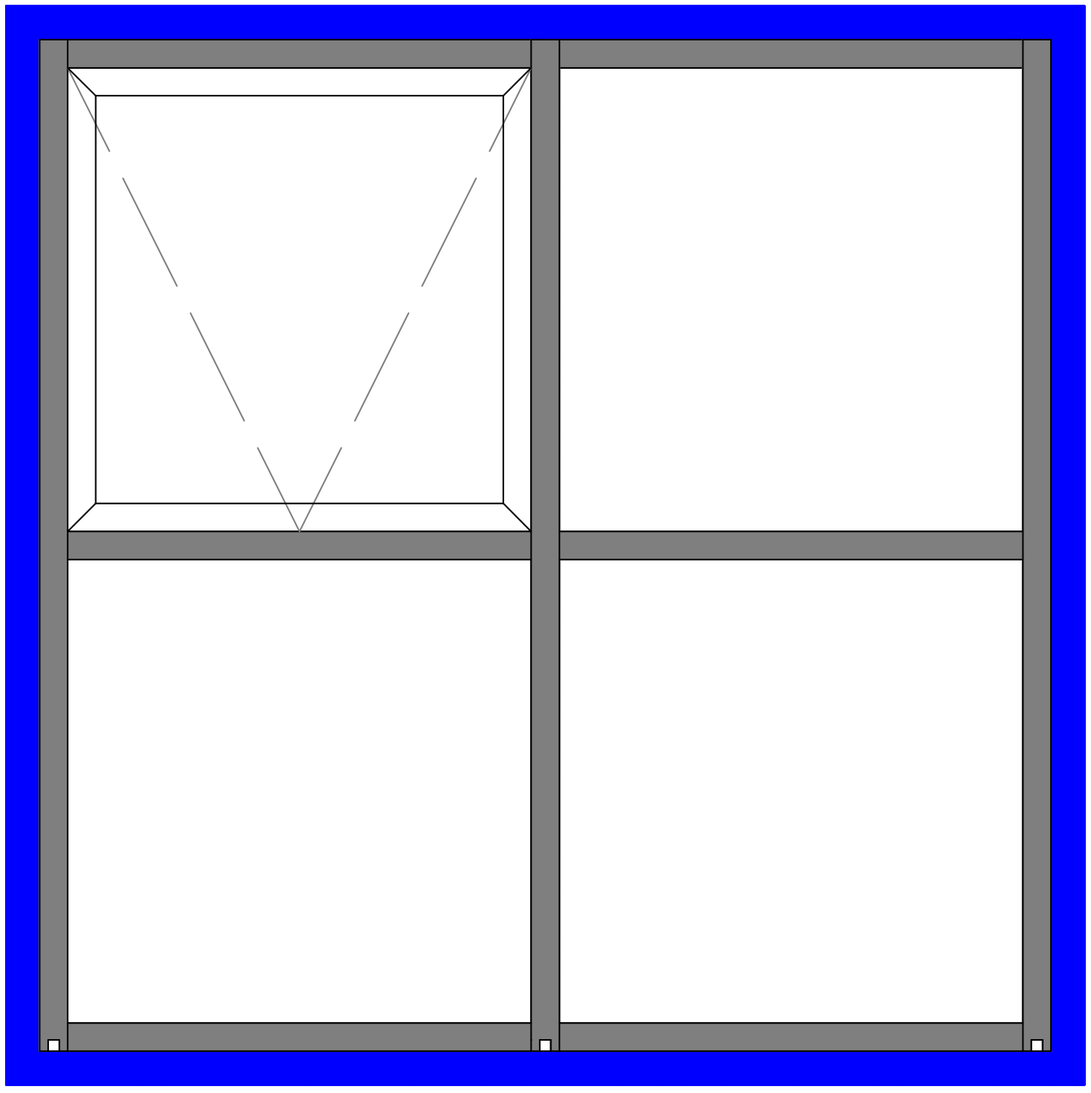
8. RESULTS

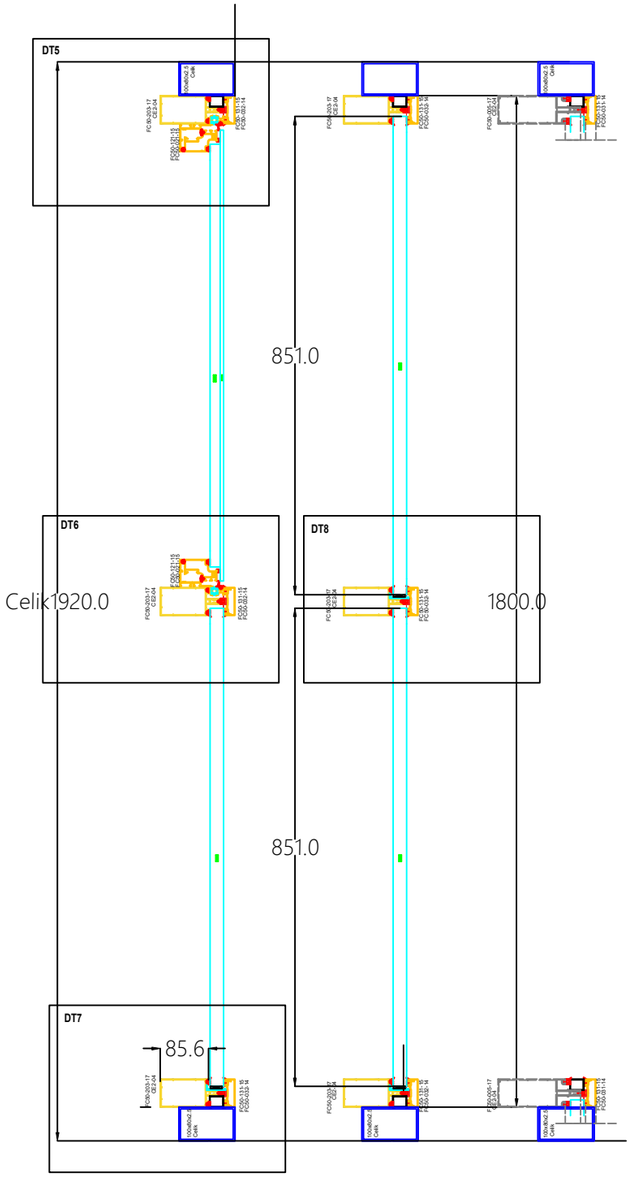
	CONDITIONS	RESULTS			CLASS
AIR PERMEABILITY EN 12152	Air permeability for overall area <1,5 m³/h.m²	+ 600 Pa	0,34	m³/h.m²	A4
	Air permeability for fixed joint length <0,5 m³/h,m		0,08	m³/h,m	
	Air permeability for overall area <1,5 m³/h.m²	- 600 Pa	0,40	m³/h.m²	A4
	Air permeability for fixed joint length <0,5 m³/h,m		0,09	m³/h,m	
AIR PERMEABILITY EN 12207	Air permeability for area of operable parts <10 m³/h.m²	+ 600 Pa	0,73	m³/h.m²	4
	Air permeability for operable joint length <2,5 m³/h.m		0,15	m³/h,m	
	Air permeability for area of operable parts <10 m³/h.m²	- 600 Pa	1,32	m³/h.m²	4
	Air permeability for operable joint length <2,5 m³/h.m		0,27	m³/h,m	
WATER TIGHTNESS (Static Pressure) EN 12154	There should not be any water leakage on the sample, during the test carried out according to 600 Pa test conditions	Water leakage was observed at 600 Pa.			R7
WIND LOAD RESISTANCE (Design Load) EN 13830	d = 9 mm (limit value) ; xp < d	+ 900 Pa	xp=0,54 mm		PASS
	d = 9 mm (limit value) ; xn < d	- 900 Pa	xn=0,495 mm		PASS
AIR PERMEABILITY EN 12152	Air permeability for overall area <1,5 m³/h.m²	+ 600 Pa	0,34	m³/h.m²	A4
	Air permeability for fixed joint length <0,5 m³/h,m		0,08	m³/h,m	
	Air permeability for overall area <1,5 m³/h.m²	- 600 Pa	0,40	m³/h.m²	A4
	Air permeability for fixed joint length <0,5 m³/h,m		0,09	m³/h,m	
AIR PERMEABILITY EN 12207	Air permeability for area of operable parts <10 m³/h.m²	+ 600 Pa	0,73	m³/h.m²	4
	Air permeability for operable joint length <2,5 m³/h.m		0,15	m³/h,m	
	Air permeability for area of operable parts <10 m³/h.m²	- 600 Pa	1,32	m³/h.m²	4
	Air permeability for operable joint length <2,5 m³/h.m		0,27	m³/h,m	
WATER TIGHTNESS (Static Pressure) EN 12154	There should not be any water leakage on the sample, during the test carried out according to 600 Pa test conditions	Water leakage was observed at 600 Pa.			R7
EXTREME LOAD EN 13830	There should not be any damage observed on the sample at ± 1350 Pa	+ 1350 Pa	No damage was observed on the sample.		PASS
		- 1350 Pa	No damage was observed on the sample.		PASS

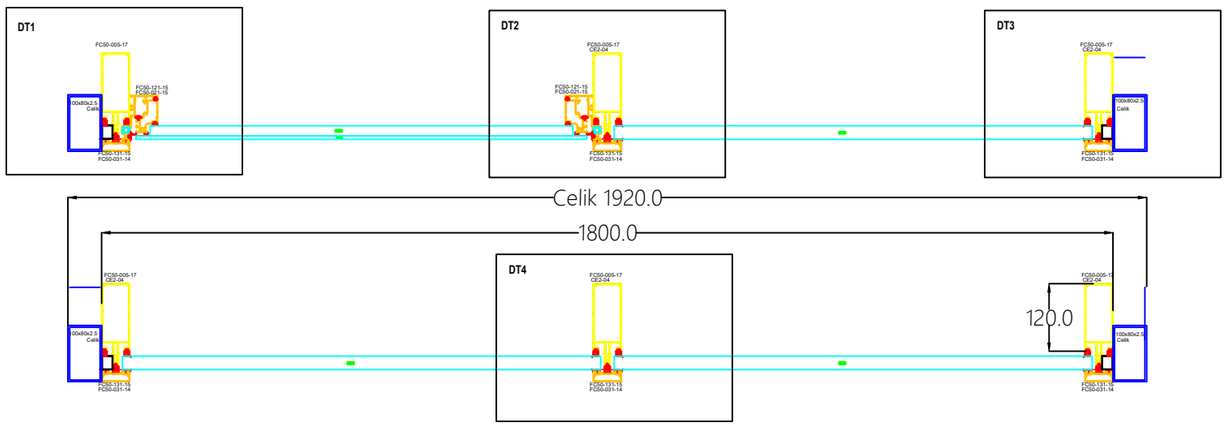
Measurement uncertainty is not included in the test / calculation results and declarations of conformity.

9. PHOTOS

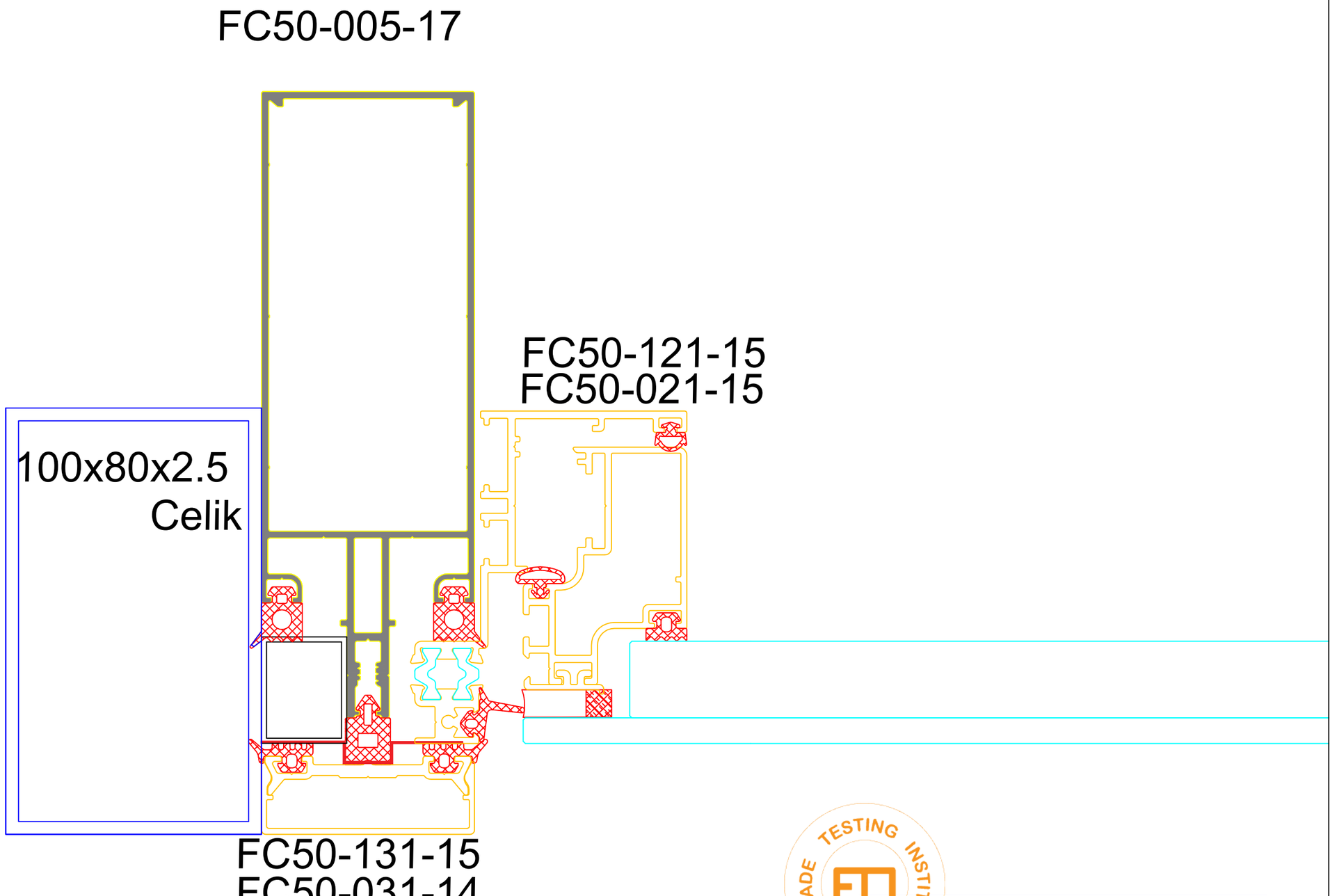
Seri: Asistal FC50 AS







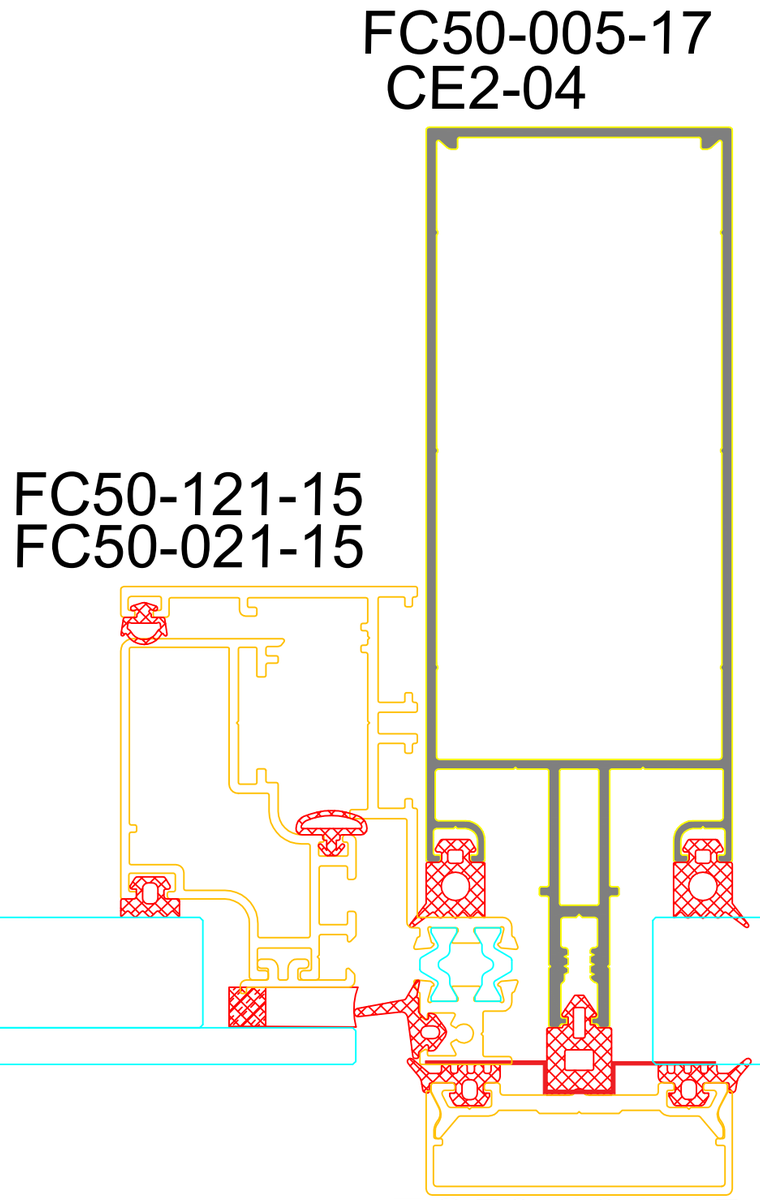
DT1



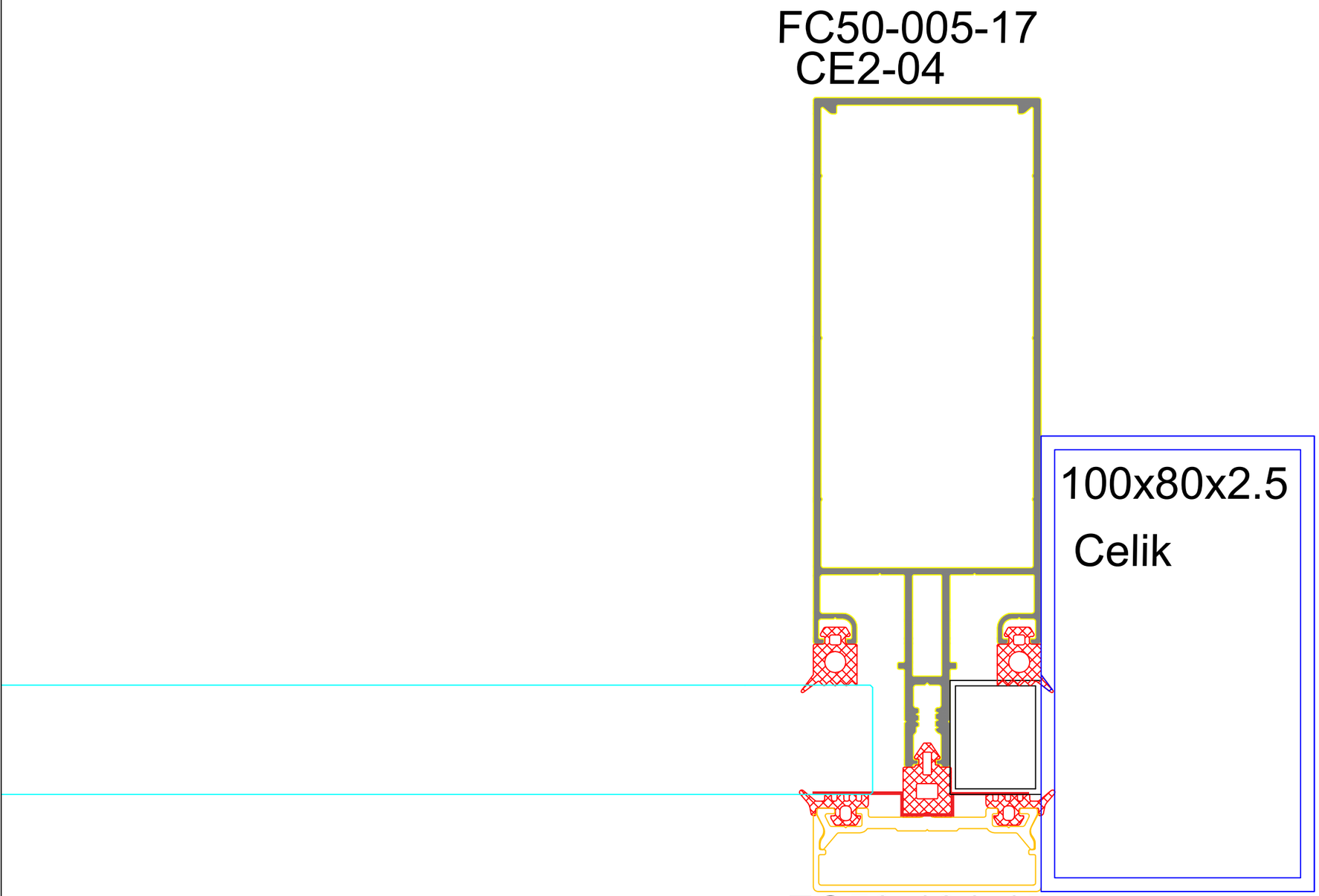
FACADE TESTING INSTITUTE

REPORT NO	020.1585.01/2021
PAGE NO	17/24

DT2


FC50-005-17
CE2-04
FC50-121-15
FC50-021-15
FC50-131-15
FC50-031-14

DT3

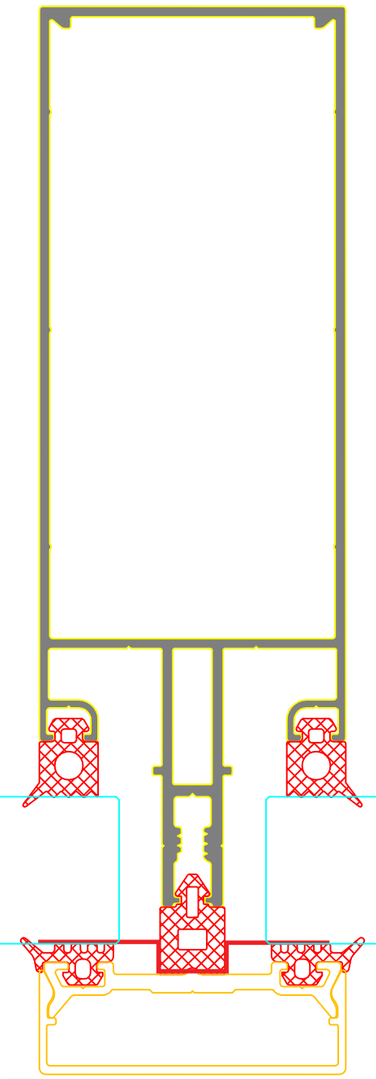


FAÇADE TESTING INSTITUTE

REPORT NO	020.1585.01/2021
PAGE NO	19/24

DT4

FC50-005-17
CE2-04

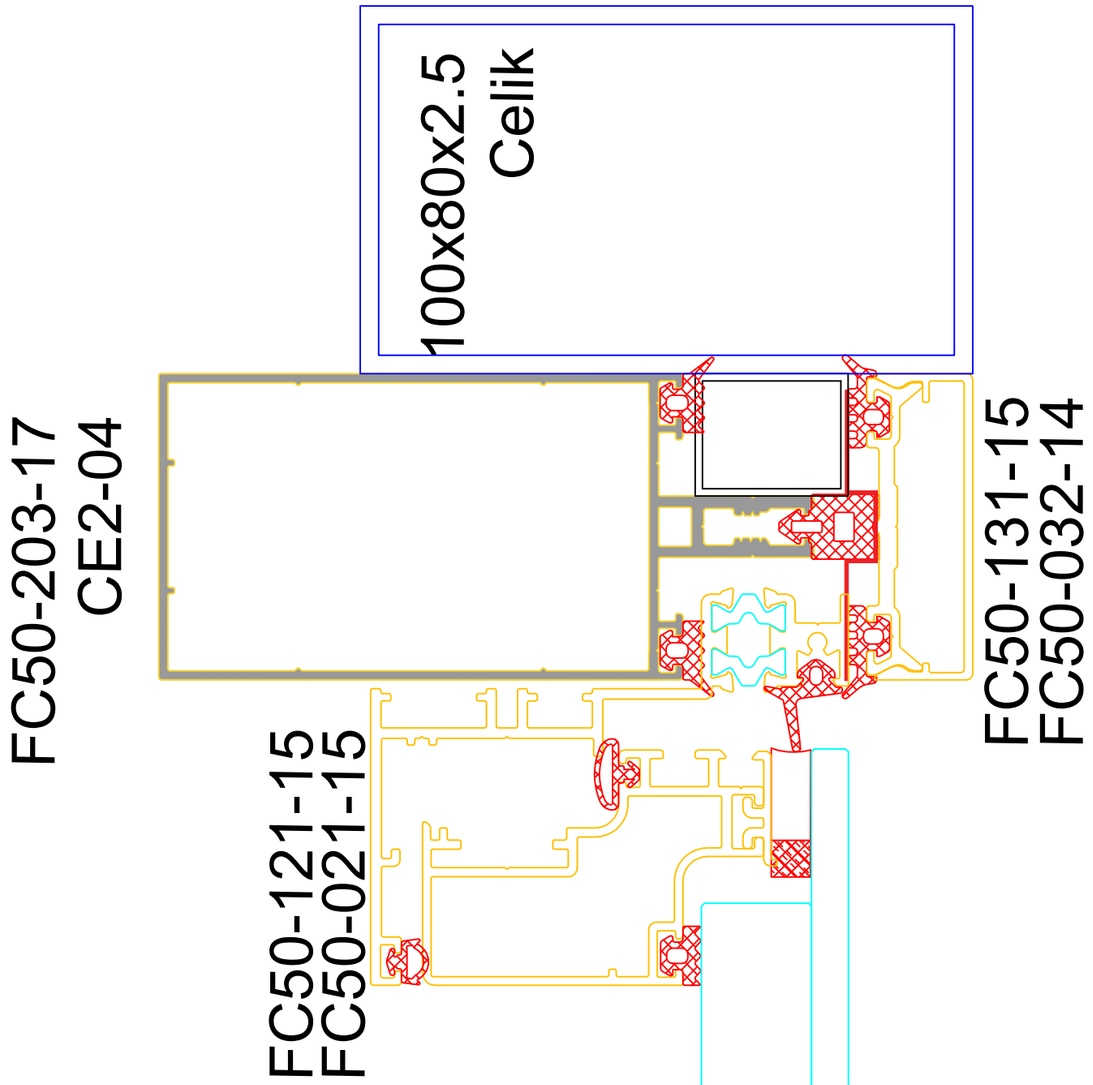


FC50-131-15
FC50-031-14

FAÇADE TESTING INSTITUTE

REPORT NO	020.1585.01/2021
PAGE NO	20/24

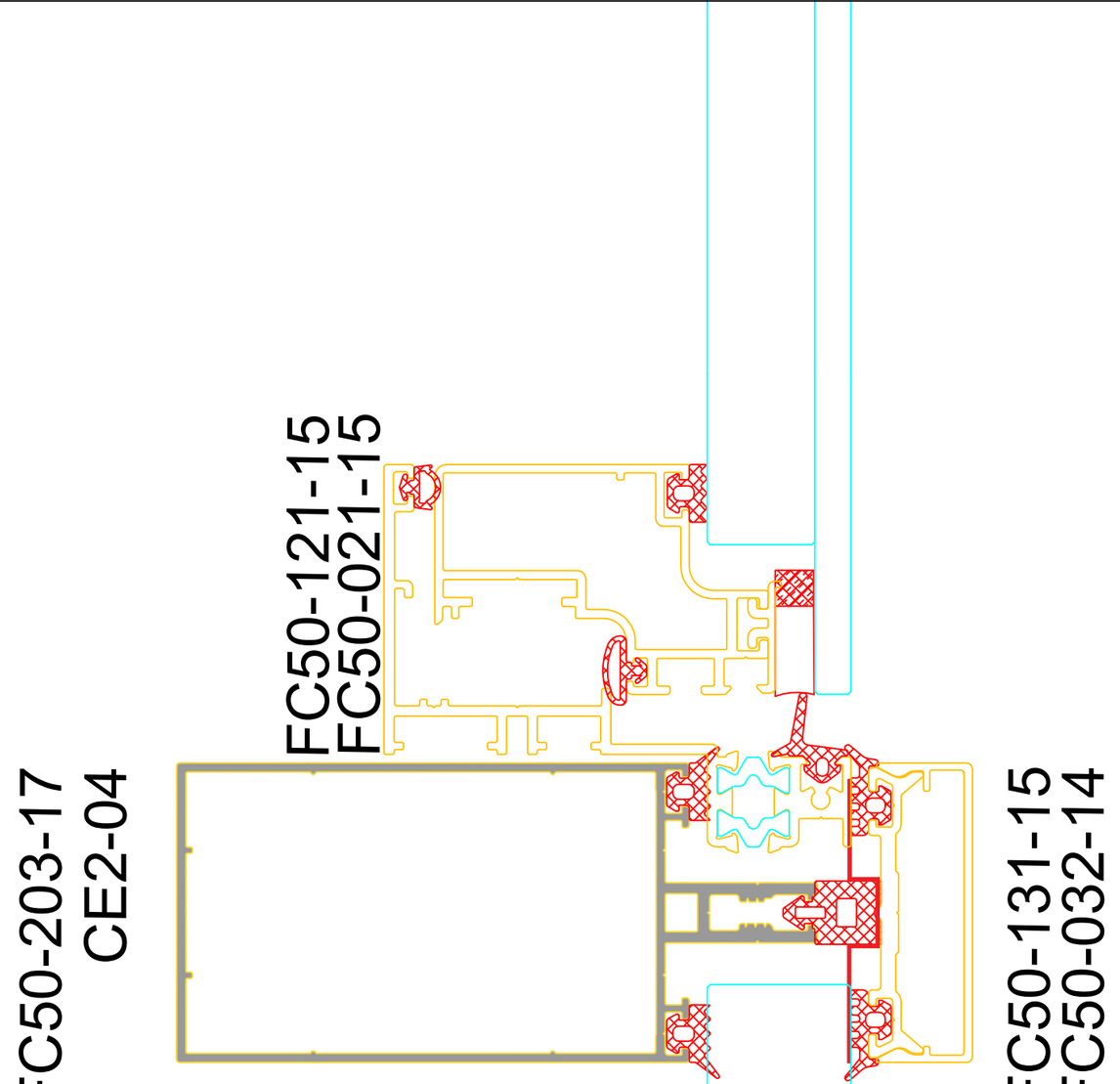
DT5



FAÇADE TESTING INSTITUTE

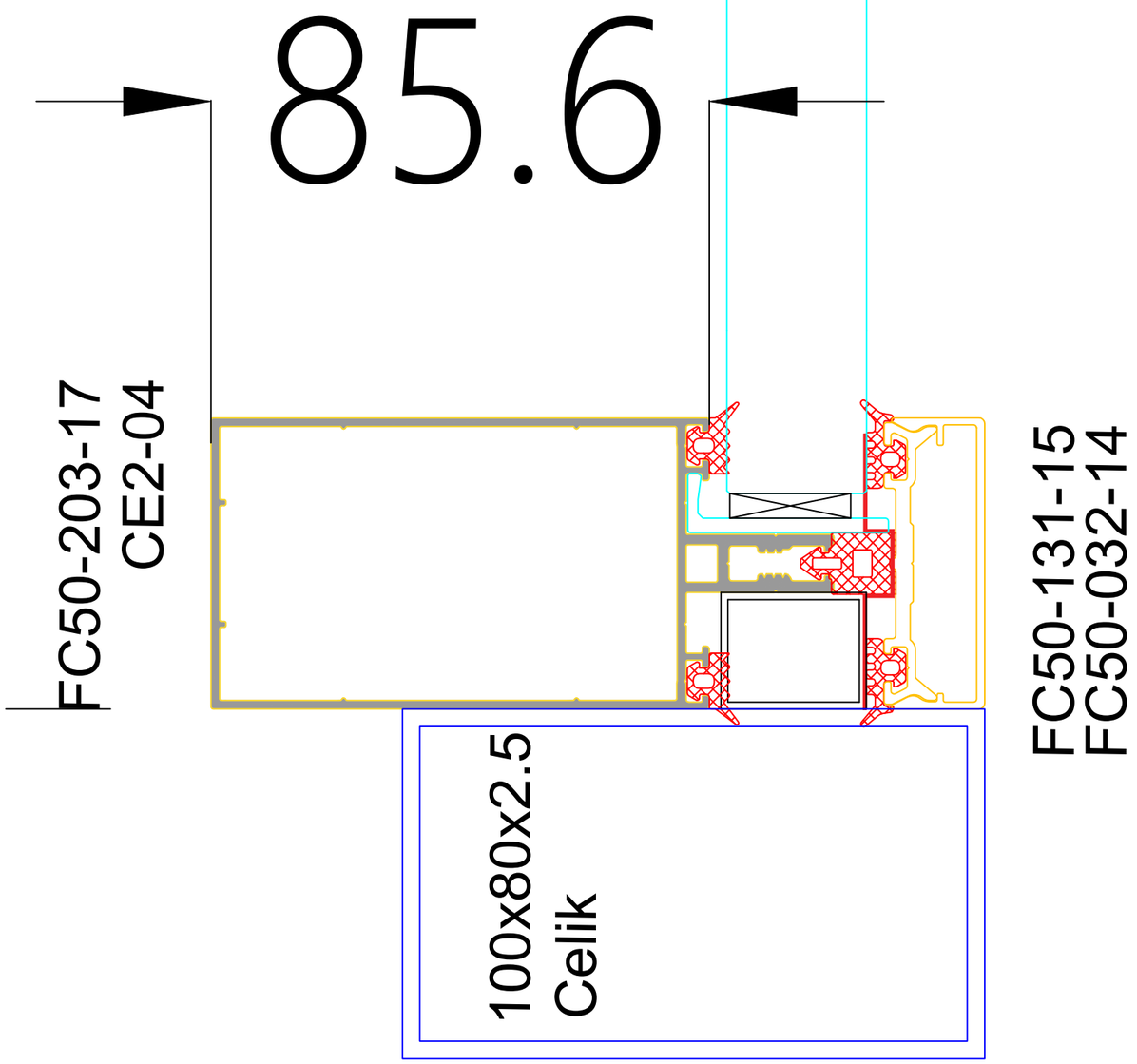
REPORT NO	020.1585.01/2021
PAGE NO	21/24

DT6



REPORT NO	020.1585.01/2021
PAGE NO	22/24

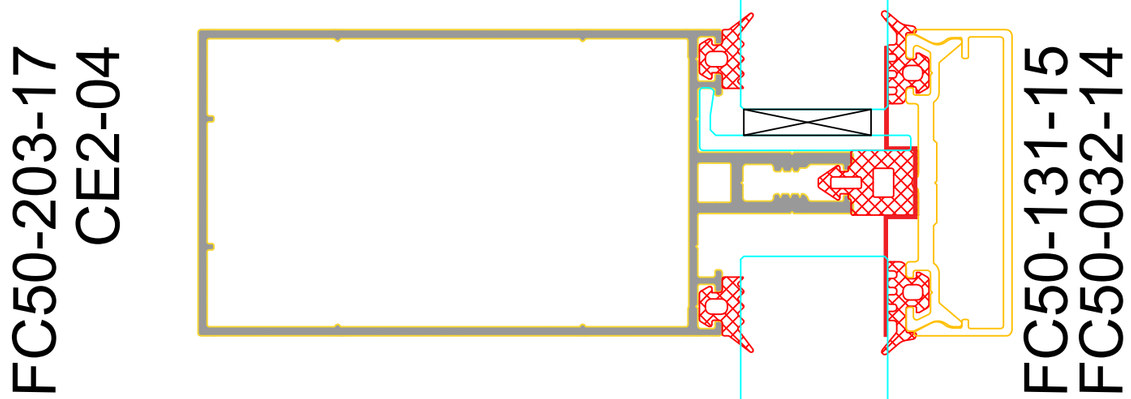
DT7



FACADE TESTING INSTITUTE

REPORT NO	020.1585.01/2021
PAGE NO	23/24

DT8



REPORT NO	020.1585.01/2021
PAGE NO	24/24