Test Report

for

KETE Window Wall System 150D

for AS/NZS 4284:2008

(SLS pressure =+/-2.50 kPa)
(ULS pressure =+/-4.70 kPa)

KETE Window Wall System 150D

RESEARCH ENGINEERING DEVELOPMENT
FACADE CONSULTANTS LIMITED
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Report GR19A04-1A

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1. Introduction

This report describes the test conducted for the **KETE Window Wall System 150D** designed by **Guangdong Kete Facadetech Co., Ltd.** The test has been conducted by using the actual samples and simulated conditions in a test chamber against the following specifications in order to ensure the safety and serviceability of the system.

1-1.1 Preliminary Test-Static Pressure Test (AS/NZS 4284:2008 Clause 8.2.2)
1-1.2 Preliminary Test-Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.2.3)
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1-7 Proof Test at Ultimate Limit State (AS/NZS 4284:2008 Clause 8.8)

2. Witness on the Test

Mr. John Zhuo and
Mr. Kim Dong of **Guangdong Kete Facadetech Co., Ltd.**

3. Test Information

Location of Testing Laboratory:	No.111, Jiaoxin Road, Lanhe Town, Nansha District, Guangzhou, China
Test Engineer	Dr. Joe Cheung of **Research Engineering Development Facade Consultants Limited (HOKLAS No. 91)**
System Designers:	**Guangdong Kete Facadetech Co., Ltd.**
Date of Test:	22nd January 2019

4. Details of the Test Specimen

4.1 General Description

The specimen is constructed in accordance with the actual size section using the identical material to the material designed by **Guangdong Kete Facadetech Co., Ltd.** and to be used in the future projects. The construction method and fixing of the specimen is also the same as the method used in actual installation of the systems on future project sites.

4.2 Testing Sample

KETE Window Wall System 150D is a window wall system including an awning window and a fixed panel. The dimension of the specimen: 3.02 m width x 2.70 m height.

4.3 As-built PMU Testing Drawing (Enclosed)

M-01-0, M-02-0, M-03-0, M-04-0, DY-101A-0, JD-01-0, JD-02-0, JD-03-0, JD-04-0, JD-05-0, JD-06-0, JD-07-0, JD-08-0, JD-09-0, JD-10-0

4.4 Glass

8mm Tempered (Heat soaked) + 12A + 8mm Tempered (Heat soaked)

4.5 Sealant

GUIBAO 998 for weather sealant

4.6 Equipment

The externally mounted chamber is equipped with a manometer, air and water flowmeter, water pump and air-blowers. The deformation of specimen shall be detected by electronic transducers.

5. Test Specification and Sequence

5.1.1 Preliminary Test-Static Pressure Test (AS/NZS 4284:2008 Clause 8.2.2)

Procedure

Preload the specimen to +2.5/-2.5kPa (positive and negative SLS design wind pressure) for 10 seconds respectively.

Requirement

No separation, plastic deformations or deleterious should be observed.

5.1.2 Preliminary Test-Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.2.3)

Procedure

(a) The test façade shall be subjected to water sprayed completely and continuously over the exterior face of the test sample at a rate not less than 0.05L/ m^2. sec.
(b) At the start of the test, the water spray operates for 5 minutes with zero pressure.
(c) Apply the air pressure difference of **1000 Pa** promptly and maintain a pressure along with the specified rate of water spray for 15 minutes.
(d) Remove the air pressure difference and stop the water spray.
(e) Observation of the internal surface of the specimen shall be carried out during the water spray operation and for 5 minutes after the water spray has stopped and there is zero pressure differential on the specimen.
(f) Any water appearing on the inside surfaces of the façade shall be recorded, with the extent and, if possible, the source of leakage indicated.

Requirement

No water leakage should be observed.

5.1.3 Preliminary Test-Water Penetration Test - Cyclic (AS/NZS 4284:2008 Clause 8.2.3)

Procedure

(a) The test shall be performed upon completion of the static water test. Should the cyclic water test not commence within 30 min of the static water test then before the start of the test, the water spray operates for 5 minutes with zero pressure.
(b) Adjust the water spray to the specified rate not less than 0.05L/ m^2. sec.
(c) Apply a cyclic positive air pressure for a duration of 5.0 minutes. The applied pressure shall be varied between the specified limits with a cycle time of 3 s to 5 s.
(d) Record the cyclic pressure by the pressure gauge data logger.

Pressure	Duration
450 - 900 - 450 Pa	5 min.
0.00 Pa	2 min.
600 - 1200 - 600 Pa	5 min.
0.00 Pa	2 min.
900 - 1800 - 900 Pa	5 min.

(e) Remove the air pressure difference and stop the water spray.
(f) Observation of the internal surface of the specimen shall be carried out during the water spray operation and for 5 minutes after the water spray has stopped and there is zero pressure differential on the specimen.

Requirement

No water leakage should be observed.

5.2 Structural Test at Serviceability Limit State (AS/NZS 4284:2008 Clause 8.3)

Procedure

Positive / negative pressure up to 100% of the SLS Wind Pressure is applied as follows:

Take-up

Pressure (kPa)	Duration	Observation
2.5 (100%)	2 min.	take readings (Initial take-up period)
0.0	2 min.	take readings then set zero (Zero stage Z1)

Mode 1

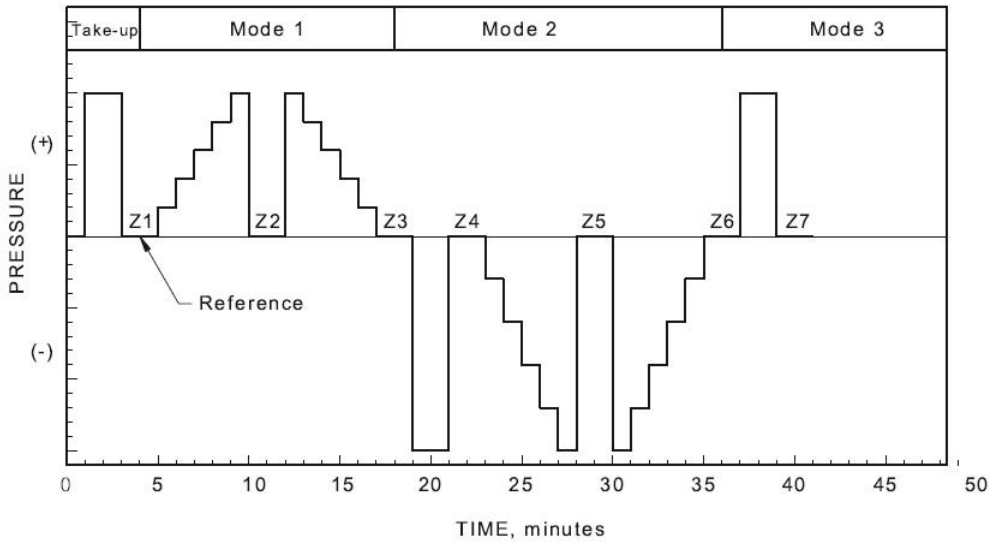
Pressure (kPa)	Duration	Observation
0.5 (20%)	1 min.	take readings
1.0 (40%)	1 min.	take readings
1.5 (60%)	1 min.	take readings
2.0 (80%)	1 min.	take readings
2.5 (100%)	1 min.	take readings
0.0	2 min.	take readings (Zero stage Z2)
2.5 (100%)	1 min.	take readings
2.0 (80%)	1 min.	take readings
1.5 (60%)	1 min.	take readings
1.0 (40%)	1 min.	take readings
0.5 (20%)	1 min.	take readings
0.0	2 min.	take readings (Zero stage Z3)

Mode 2

Pressure (kPa)	Duration	Observation
-2.5 (100%)	2 min.	take readings (take-up period)
0.0	2 min.	take readings (Zero Stage Z4)
-0.5 (20%)	1 min.	take readings
-1.0 (40%)	1 min.	take readings
-1.5 (60%)	1 min.	take readings
-2.0 (80%)	1 min.	take readings
-2.5(100%)	1 min.	take readings
0.0	2 min.	take readings (Zero stage Z5)
-2.5 (100%)	1 min.	take readings
-2.0 (80%)	1 min.	take readings
-1.5 (60%)	1 min.	take readings
-1.0 (40%)	1 min.	take readings
-0.5 (20%)	1 min.	take readings
0.0	2 min.	take readings (Zero stage Z6)

Mode 3

Pressure (kPa)	Duration	Observation
2.5 (100%)	2 min.	take readings
0.0	2 min.	take readings (Zero stage Z7)



NOTE: The displacements used for deflection/span ratios are based on zero deflections at the reference stages Z1 and Z4. The reducing pressure steps from Z2 to Z3 and from Z5 to Z6 are optional.

Requirement

The performance of the specimen is evaluated against the following criteria.

(i) The glass should not break.

(ii) The deflection of the framing members of the specimen should not exceed span/250, during the positive and negative pressure tests.

(iii) The glass panel deflection should not exceed span/60.

(iv) Maximum successive member displacement should not exceed 3mm.

(v) Maximum displacement (Framing member) should not exceed 20 mm.

5.3 Operating Force Test (AS/NZS 4420.1-2016 Clause 4)

Procedure

Measure the starting force and operating force required to move the operable panel with a load cell system. The measurement shall be carried out three times and the mean of each set of tree readings shall be taken.

Requirement (AS2047-2014 Table 2.2)

Product and movement type	Initiate (N)	Maintain (N)
Projecting Sash	160	80

5.4 Air Infiltration Test (AS/NZS 4284:2008 Clause 8.4)

Procedure

(a) Adjust the air flow through the test chamber to provide the specified test pressure difference across the test specimen. The total air infiltration rates through the specimen and the test chamber shall be measured by positive and negative pressure. No further testing shall be required if the air infiltration rates determined on combined specimen and test chamber are less than the specified air infiltration rate.

(b) Where the total air infiltration rate is greater than the specified air infiltration rates, or the specifier requires actual air infiltration rates, the face of the specimen shall be sealed airtight by covering it with an impervious film. If this is not practicable, all joints, weepholes and glazing or sealant lines of the specimen shall be sealed with air-impervious tape and air infiltration rates of the chamber only determined. The air infiltration rates through the specimen shall be the difference between the total and sealed airflow meter readings at both positive and negative pressures.

Air infiltration is to be checked under pressure of +/-150 Pa and +/-300 Pa.

Requirement

Air infiltration rate should not exceed: 1.6 L/sec/m^2

5.5 Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.5)

Procedure

(a) The test façade shall be subjected to water sprayed completely and continuously over the exterior face of the test sample at a rate not less than 0.05L/ m2. sec.

(b) At the start of the test, the water spray operates for 5 minutes with zero pressure.

(c) Apply the air pressure difference of **1000 Pa** promptly and maintain a pressure along with the specified rate of water spray for 15 minutes.

(d) Remove the air pressure difference and stop the water spray.

(e) Observation of the internal surface of the specimen shall be carried out during the water spray operation and for 5 minutes after the water spray has stopped and there is zero pressure differential on the specimen.

(f) Any water appearing on the inside surfaces of the façade shall be recorded, with the extent and, if possible, the source of leakage indicated.

Requirement

No water leakage should be observed.

5.6 Water Penetration Test - Cyclic (AS/NZS 4284:2008 Clause 8.6)

Procedure

(a) The test shall be performed upon completion of the static water test. Should the cyclic water test not commence within 30 min of the static water test then before the start of the test, the water spray operates for 5 minutes with zero pressure.

(b) Adjust the water spray to the specified rate not less than 0.05L/ m^2. sec.

(c) Apply a cyclic positive air pressure for a duration of 5.0 minutes. The applied pressure shall be varied between the specified limits with a cycle time of 3 s to 5 s.

(d) Record the cyclic pressure by the pressure gauge data logger.

Pressure	Duration
450 - 900 - 450 Pa	5 min.
0.00 Pa	2 min.
600 - 1200 - 600 Pa	5 min.
0.00 Pa	2 min.
900 - 1800 - 900 Pa	5 min.

(e) Remove the air pressure difference and stop the water spray.

(f) Observation of the internal surface of the specimen shall be carried out during the water spray operation and for 5 minutes after the water spray has stopped and there is zero pressure differential on the specimen.

Requirement

No water leakage should be observed.

5.7 Structural Test at Ultimate Limit State (AS/NZS 4284:2008 Clause 8.8)

Procedure

Positive / negative pressure up to Ultimate Limit State is applied and held for 10 seconds.

Positive

Pressure	Duration
0 to 4.7 kPa	50s-60s
4.7 kPa	10s

Negative

Pressure	Duration
0 to -4.7 kPa	50s-60s
-4.7 kPa	10s

The sample shall be inspected at the end of each of the positive and negative pressure stages. Record all incidences of non-linear deflection and/or collapse.

Requirement

There shall be no collapse of the test sample. Collapse shall mean any one or any combination of the following:

(a) Disengagement or partial disengagement of any framing member, façade panel or any part thereof.

(b) Failure of any fixings that connect the façade to the building structure, such that the test sample is unstable.

(c) Failure of any stop, locking device, fastener or support which would allow an opening light to come open.

(d) Repeated breakage of glass resulting in loss of chamber pressure. Glass may only be replaced once before the sample is deemed to have collapsed.

(e) Repeated cracking of glass which does not result in loss of chamber pressure. Glass may only be replaced twice before the sample is deemed to have collapsed.

(f) Any permanent distortion of a panel shall be noted and documented in the test

6. Test Procedure and Observations

6.1.1 Preliminary Test-Static Pressure Test (AS/NZS 4284:2008 Clause 8.2.2)

Procedure

The testing procedures described in section 5.1.1 were followed.

Observation

No separation, plastic deformations or deleterious was observed.

6.1.2 Preliminary Test-Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.2.3)

Procedure

The testing procedures described in section 5.1.2 were followed.

Observation

No water leakage was observed.

6.1.3 Preliminary Test-Water Penetration Test - Cyclic (AS/NZS 4284:2008 Clause 8.2.3)

Procedure

The testing procedures described in section 5.1.3 were followed.

Observation

No water leakage was observed.

6.2 Structural Test at Serviceability Limit State (AS/NZS 4284 Clause 8.3)

Procedure

The testing procedures described in section 5.2 were followed.

Observation for positive pressure up to 2.50 kPa

(For Locations of transducers, please refer to Figure 1)

Pressure in kPa	Displacement in mm									
	Locations of Transducers									
	Mullion			Mullion			Transom			
	Span = 2560 mm			Span = 1365 mm			Span = 1365 mm			
	1	2	3	4	5	6	7	8	9	
Take-up										
At Pressure = **2.50**	4.78	13.82	6.71	8.79	13.57	14.84	3.73	9.29	13.29	
At Pressure = **0.00**	0.48	0.59	0.36	0.67	0.85	0.92	0.29	0.48	0.64	
Zero reference	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Z1
Mode 1										
At Pressure = **0.50**	0.56	2.60	1.61	2.00	2.62	2.61	0.51	1.50	2.38	
At Pressure = **1.00**	1.78	5.85	3.67	4.61	5.89	5.96	1.19	3.46	5.41	
At Pressure = **1.50**	2.86	8.56	4.82	6.12	8.41	8.90	1.87	5.32	8.05	
At Pressure = **2.00**	3.65	11.00	5.66	7.22	10.59	11.54	2.66	7.07	10.44	
At Pressure = **2.50**	4.34	13.30	6.39	8.19	12.75	14.03	3.52	8.88	12.73	
Relative Disp. (mm)	--	7.935	--	--	1.640	--	--	0.755	--	
Permitted Relative Displ. #	--	10.240	--	--	5.460	--	--	5.460	--	
At Pressure = **0.00**	0.05	0.07	0.09	0.10	0.10	0.10	0.05	0.05	0.07	Z2
Relative Disp. (mm)	--	0.000	--	--	0.000	--	--	-0.010	--	
At Pressure = **2.50**	4.33	13.26	6.32	8.08	12.61	13.96	3.49	8.86	12.69	
Relative Disp. (mm)	--	7.935	--	--	1.590	--	--	0.770	--	
Permitted Relative Displ. #	--	10.240	--	--	5.460	--	--	5.460	--	
At Pressure = **2.00**	4.04	11.46	5.87	7.47	11.15	12.16	3.00	7.64	10.97	
At Pressure = **1.50**	3.57	9.38	5.19	6.55	9.26	9.98	2.33	6.13	8.94	
At Pressure = **1.00**	2.98	7.21	4.41	5.51	7.26	7.64	1.62	4.57	6.85	
At Pressure = **0.50**	1.98	4.08	2.60	3.27	4.13	4.26	0.81	2.52	3.88	
At Pressure = **0.00**	0.07	0.08	0.10	0.12	0.12	0.12	0.04	0.06	0.08	Z3
Relative Disp. (mm)	--	-0.005	--	--	0.000	--	--	0.000	--	

note -The Deflection of Framing Member should not exceed span/250

Detailed Calculation for Relative Deflections at Design Wind Load (2.50 kPa)

Relative Deflection of Mullion at Locations 1, 2 and 3

= 13.30 - (4.34 + 6.39)/2
= 7.935 mm < Span / 250 = 2560.0 / 250 = 10.240 mm
= span / 323 = 10.240 mm O.K.

Relative Deflection of Mullion at Locations 4, 5 and 6

= 12.75 - (8.19 + 14.03)/2
= 1.640 mm < Span / 250 = 1365.0 / 250 = 5.460 mm
= span / 832 = 5.460 mm O.K.

Relative Deflection of Transom at Locations 7, 8 and 9

= 8.86 - (3.49 + 12.69)/2
= 0.770 mm < Span / 250 = 1365.0 / 250 = 5.460 mm
= span / 1773 = 5.460 mm O.K.

Observation for negative pressure up to -2.50 kPa

(For Locations of transducers, please refer to Figure 1)

Pressure in kPa	Displacement in mm									
	Locations of Transducers									
	Mullion Span = 2560 mm			Mullion Span = 1365 mm			Transom Span = 1365 mm			
	1	2	3	4	5	6	7	8	9	
Mode 2										
At Pressure = **-2.50**	6.44	14.12	5.10	8.04	13.10	14.95	3.93	9.66	13.93	
At Pressure = **0.00**	2.23	2.01	0.97	1.40	1.96	2.42	0.59	1.53	2.09	Z4
Relative Disp. (mm)	--	0.410	--	--	0.050	--	--	0.190	--	
At Pressure = **-0.50**	2.77	4.54	2.43	3.24	4.51	5.01	1.10	2.96	4.47	
At Pressure = **-1.00**	3.53	6.79	3.17	4.41	6.59	7.39	1.70	4.45	6.68	
At Pressure = **-1.50**	4.55	9.17	3.81	5.57	8.70	9.90	2.35	6.10	9.05	
At Pressure = **-2.00**	5.50	11.56	4.43	6.77	10.85	12.38	3.06	7.82	11.42	
At Pressure = **-2.50**	6.46	14.08	5.08	8.01	13.12	15.01	3.94	9.65	13.91	
Relative Disp. (mm)	--	8.310	--	--	1.610	--	--	0.725	--	
Permitted Relative Displ. #	--	10.240	--	--	5.460	--	--	5.460	--	
At Pressure = **0.00**	2.44	2.25	1.13	1.60	2.25	2.77	0.66	1.70	2.33	Z5
Relative Disp. (mm)	--	0.465	--	--	0.065	--	--	0.205	--	
At Pressure = **-2.50**	6.40	14.03	5.03	7.98	13.09	14.98	3.86	9.57	13.85	
Relative Disp. (mm)	--	8.315	--	--	1.610	--	--	0.715	--	
Permitted Relative Displ. #	--	10.240	--	--	5.460	--	--	5.460	--	
At Pressure = **-2.00**	6.03	12.17	4.66	7.16	11.47	13.11	3.31	8.29	12.04	
At Pressure = **-1.50**	5.54	10.13	4.19	6.19	9.63	11.05	2.67	6.91	10.04	
At Pressure = **-1.00**	4.91	8.04	3.67	5.14	7.74	8.91	2.05	5.50	7.98	
At Pressure = **-0.50**	3.84	5.43	2.88	3.84	5.45	6.26	1.40	3.75	5.43	
At Pressure = **0.00**	2.58	2.35	1.21	1.71	2.43	2.92	0.68	1.81	2.45	Z6
Relative Disp. (mm)	--	0.455	--	--	0.115	--	--	0.245	--	
Mode 3										
At Pressure = **2.50**	4.29	13.13	6.27	8.01	12.51	13.85	3.48	8.71	12.57	
Relative Disp. (mm)	--	7.850	--	--	1.580	--	--	0.685	--	
At Pressure = **0.00**	0.07	0.23	0.14	0.21	0.36	0.43	0.07	0.18	0.23	Z7
Relative Disp. (mm)	--	0.125	--	--	0.040	--	--	0.030	--	

note -The Deflection of Framing Member should not exceed span/250

Detailed Calculation for Relative Deflections at Design Wind Load (-2.50 kPa)

Relative Deflection of Mullion at Locations 1, 2 and 3

= 14.03 - (6.40 + 5.03)/2
= 8.315 mm < Span / 250 = 2560.0 / 250 = 10.240 mm
= span / 308 = 10.240 mm O.K.

Relative Deflection of Mullion at Locations 4, 5 and 6

= 13.12 - (8.01 + 15.01)/2
= 1.610 mm < Span / 250 = 1365.0 / 250 = 5.460 mm
= span / 848 = 5.460 mm O.K.

Relative Deflection of Transom at Locations 7, 8 and 9

= 9.65 - (3.94 + 13.91)/2
= 0.725 mm < Span / 250 = 1365.0 / 250 = 5.460 mm
= span / 1883 = 5.460 mm O.K.

Observation for positive pressure up to 2.50 kPa

(For Locations of transducers, please refer to Figure 1)

Pressure in kPa	Glass Panel Span = 1325 mm			
	10	11	12	
Take-up				
At Pressure = **2.50**	14.95	19.31	4.97	
At Pressure = **0.00**	0.48	0.41	0.18	
Zero reference	0.00	0.00	0.00	Z1
Mode 1				
At Pressure = **0.50**	2.96	4.11	0.94	
At Pressure = **1.00**	6.49	8.53	1.98	
At Pressure = **1.50**	9.46	12.42	2.97	
At Pressure = **2.00**	12.11	15.90	3.95	
At Pressure = **2.50**	14.57	19.08	4.87	
Relative Disp. (mm)	--	9.360	--	
Permitted Relative Displ. #	--	20.000	--	
At Pressure = **0.00**	0.06	0.07	0.03	Z2
Relative Disp. (mm)	--	0.025	--	
At Pressure = **2.50**	14.56	19.09	4.83	
Relative Disp. (mm)	--	9.395	--	
Permitted Relative Displ. #	--	20.000	--	
At Pressure = **2.00**	12.53	16.32	4.14	
At Pressure = **1.50**	10.18	13.06	3.30	
At Pressure = **1.00**	7.77	9.56	2.36	
At Pressure = **0.50**	4.37	5.12	1.25	
At Pressure = **0.00**	0.06	0.08	0.02	Z3
Relative Disp. (mm)	--	0.040	--	

note -The Deflection of glass panel should not exceed span/60 and 20mm

Detailed Calculation for Relative Deflections at Design Wind Load (2.50 kPa)

Relative Deflection of Glass Panel at Locations 10, 11 and 12

= 19.09 - (14.56 + 4.83)/2

= 9.395 mm < Span / 60 = 1325.0 / 60 = 22.083 mm

= span / 141 = 20.000 mm O.K.

Observation for negative pressure up to -2.50 kPa

(For Locations of transducers, please refer to Figure 1)

Pressure in kPa	Displacement in mm Locations of Transducers Glass Panel Span = 1325 mm			
	10	11	12	
Mode 2				
At Pressure = **-2.50**	15.22	19.71	6.60	
At Pressure = **0.00**	1.69	1.12	0.52	Z4
Relative Disp. (mm)	--	0.015	--	
At Pressure = **-0.50**	4.62	5.26	1.52	
At Pressure = **-1.00**	7.19	9.07	2.63	
At Pressure = **-1.50**	9.83	12.74	3.78	
At Pressure = **-2.00**	12.45	16.24	5.07	
At Pressure = **-2.50**	15.19	19.69	6.59	
Relative Disp. (mm)	--	8.800	--	
Permitted Relative Displ. #	--	20.000	--	
At Pressure = **0.00**	1.94	1.31	0.65	Z5
Relative Disp. (mm)	--	0.015	--	
At Pressure = **-2.50**	15.11	19.57	6.47	
Relative Disp. (mm)	--	8.780	--	
Permitted Relative Displ. #	--	20.000	--	
At Pressure = **-2.00**	13.03	16.73	5.52	
At Pressure = **-1.50**	10.72	13.42	4.29	
At Pressure = **-1.00**	8.40	10.02	3.17	
At Pressure = **-0.50**	5.48	5.82	1.85	
At Pressure = **0.00**	2.03	1.33	0.59	Z6
Relative Disp. (mm)	--	0.020	--	
Mode 3				
At Pressure = **2.50**	14.45	19.26	4.79	
Relative Disp. (mm)	--	9.640	--	
At Pressure = **0.00**	0.24	0.12	0.16	Z7
Relative Disp. (mm)	--	-0.080	--	

note -The Deflection of glass panel should not exceed span/60 and 20mm

Detailed Calculation for Relative Deflections at Design Wind Load (-2.50 kPa)

Relative Deflection of Glass Panel at Locations 10, 11 and 12

= 19.69 - (15.19 + 6.59)/2

= 8.800 mm < Span / 60 = 1325.0 / 60 = 22.083 mm

= span / 151 = 20.000 mm O.K.

6.3 Operating Force Test (AS/NZS 4420.1-2016 Clause 4)

Procedure

The testing procedures described in section 5.3 were followed.

Observation

Product and movement type		Test Force(N)			
		1	2	3	Mean
Awning Sash	Open	54.6	52.6	52.0	53.06 < 160

6.4 Air Infiltration Test (AS/NZS 4284:2008 Clause 8.4)

Procedure

The testing procedures described in section 5.4 were followed.

Observation of Window Wall System 150A

Specimen area = 3.02 x 2.70 = 8.154 m^2

The airflow rates measured during the test were as follows:

Test Pressure (Pa)	+150	+300	-150	-300
Air Flow Rate (m^3/hr)	18.04	20.52	17.31	20.25

Allowable Flow Rate for **Specimen** at +150Pa

= 8.154 m^2 × 1.6 L/sec/m^2

= 13.046 L/sec

= 46.96 m^3/hr > 18.04 m^3/hr **O.K.**

Allowable Flow Rate for **Specimen** at -150Pa

= 8.154 m^2 × 1.6 L/sec/m^2

= 13.046 L/sec

= 46.96 m^3/hr > 17.51 m^3/hr **O.K.**

The rate of air leakage of the specimen was within allowable values.
(AS/NZS 4284:2008 Table D1)

Allowable Flow Rate for **Specimen** at +300Pa

= 8.154 m^2 × 1.0 L/sec/m^2

= 8.154 L/sec

= 29.35 m^3/hr > 20.52 m^3/hr **O.K.**

Allowable Flow Rate for **Specimen** at -300Pa

= 8.154 m^2 × 1.0 L/sec/m^2

= 8.154 L/sec

= 29.35 m^3/hr > 20.25 m^3/hr **O.K.**

The rate of air leakage of the specimen was within allowable values.
(For information)

6.5 Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.5)

Procedure

The testing procedures described in section 5.5 were followed.

Observation

No water leakage was observed.

6.6 Water Penetration Test - Cyclic (AS/NZS 4284:2008 Clause 8.6)

Procedure

The testing procedures described in section 5.6 were followed.

Observation

No water leakage was observed.

6.7 Structural Test at Ultimate Limit State (AS/NZS 4284:2008 Clause 8.8)

Procedure

The testing procedures described in section 5.7 were followed.

Observation

No collapse was observed under the specified pressure.
The maximum pressures attained were +4.7 kPa/ -4.7 kPa.

7. Summary of Test Results

Test	Results
1.1.1) Preliminary Test- Static Pressure Test (AS/NZS 4284:2008 Clause 8.2.2)	No separation, plastic deformations or deleterious was observed. Please refer to Clause 6.1.1 for details.
1.1.2) Preliminary Test- Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.2.3)	No water leakage was observed. Please refer to Clause 6.1.2 for details.
1.1.3) Preliminary Test- Water Penetration Test - Cyclic (AS/NZS 4284:2008 Clause 8.2.3)	No water leakage was observed. Please refer to Clause 6.1.3 for details.
2) Structural Test at Serviceability Limit State (AS/NZS 4284:2008 Clause 8.3)	During the structural test at Serviceability Limit State, the deflections of the framing members as well as glass panel were within the allowable deflection limits. Maximum successive member displacement did not exceed 3 mm. (SLS pressure =+/-2.5 kPa) Please refer to Clause 6.2 for details.
3) Operating Force Test (AS/NZS 4420.1-2016 Clause 4)	The test force was within allowable value. Please refer to Clause 6.3 for details.
4) Air Infiltration Test (AS/NZS 4284:2008 Clause 8.4)	The rate of air leakage of the specimen at +/-150Pa was less than 1.6 L/sec/m^2. The rate of air leakage of the specimen at +/-300Pa was less than 1.0 L/sec/m^2. Please refer to Clause 6.4 for details.
5)Water Penetration Test - Static (AS/NZS 4284:2008 Clause 8.5)	No water leakage was observed. Please refer to Clause 6.5 for details.
6)Water Penetration Test - Cyclic (AS/NZS 4284:2008 Clause 8.6)	No water leakage was observed. Please refer to Clause 6.6 for details.
7) Structural Test at Ultimate Limit State (AS/NZS 4284:2008 Clause 8.8)	No collapse was observed under the specified pressure. (ULS pressure =+/-4.7 kPa) Please refer to Clause 6.7 for details.

I certify the above test results are the true record for the performance test of the **KETE Window Wall System 150D** designed by **Guangdong Kete Facadetech Co., Ltd.**

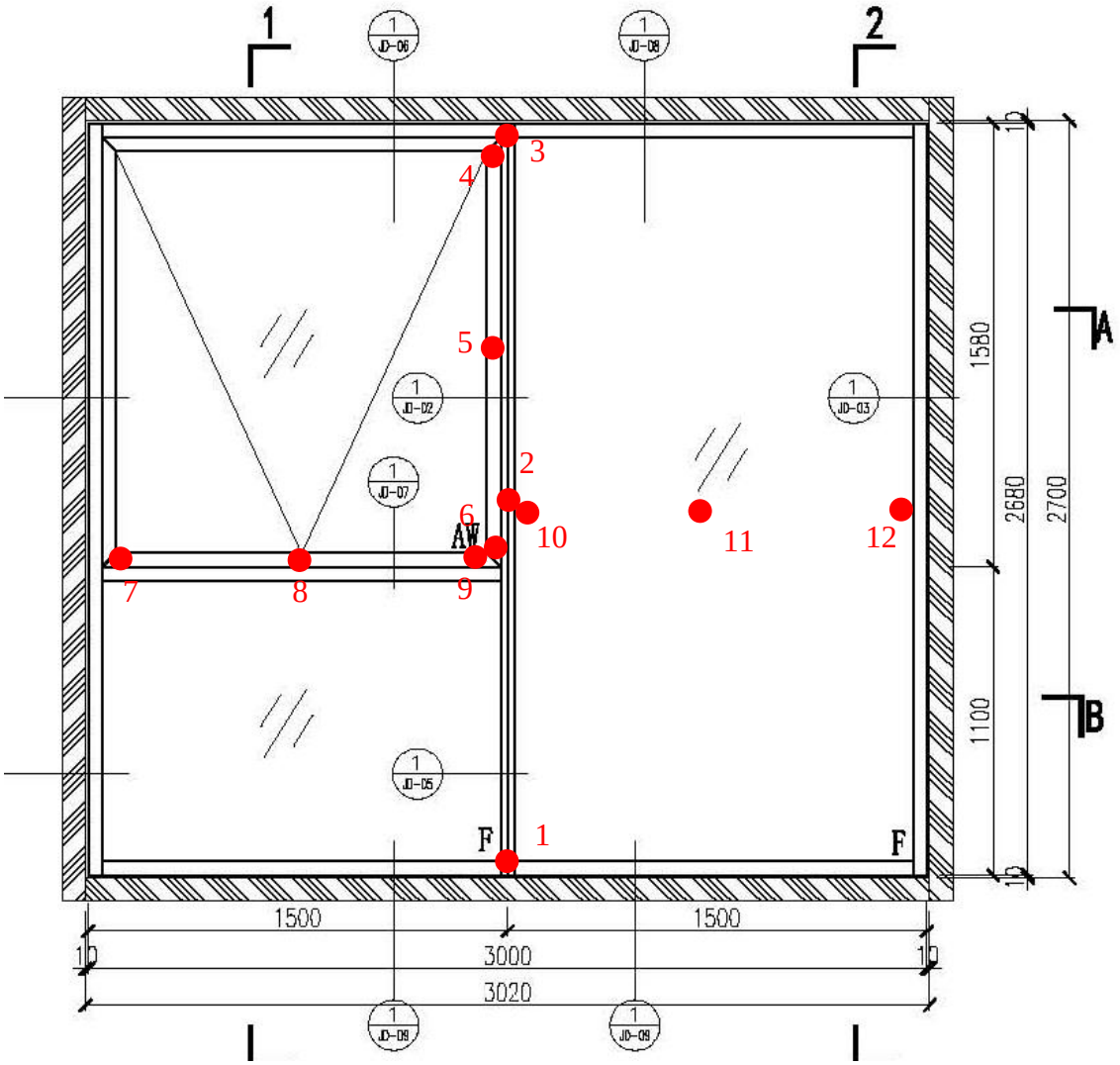
For and on the behalf of
Research Engineering Development
Façade Consultants Limited

Dr. ZHANG Zhuoran
Authorized Signature

Appendices

Figure 1 - Location of displacement transducers

Photo 1 - Photograph of the PMU Test Mock-up



Mullion: 1-2-3, 4-5-6
Transom: 7-8-9
Glass Panel: 10-11-12

Figure 1: Locations of Displacement Transducers (Outside View)

Photo 1: Mock-up of the Window Wall System 150D

- End of Report -

As-built PMU Test drawings from client

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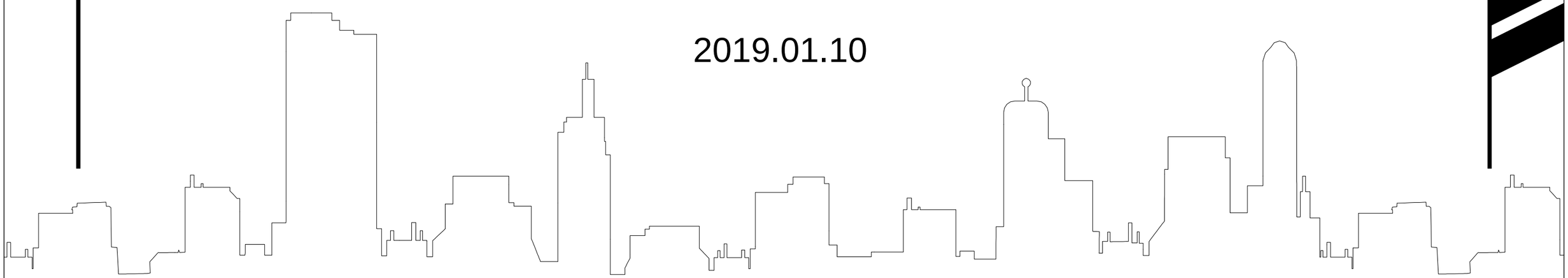
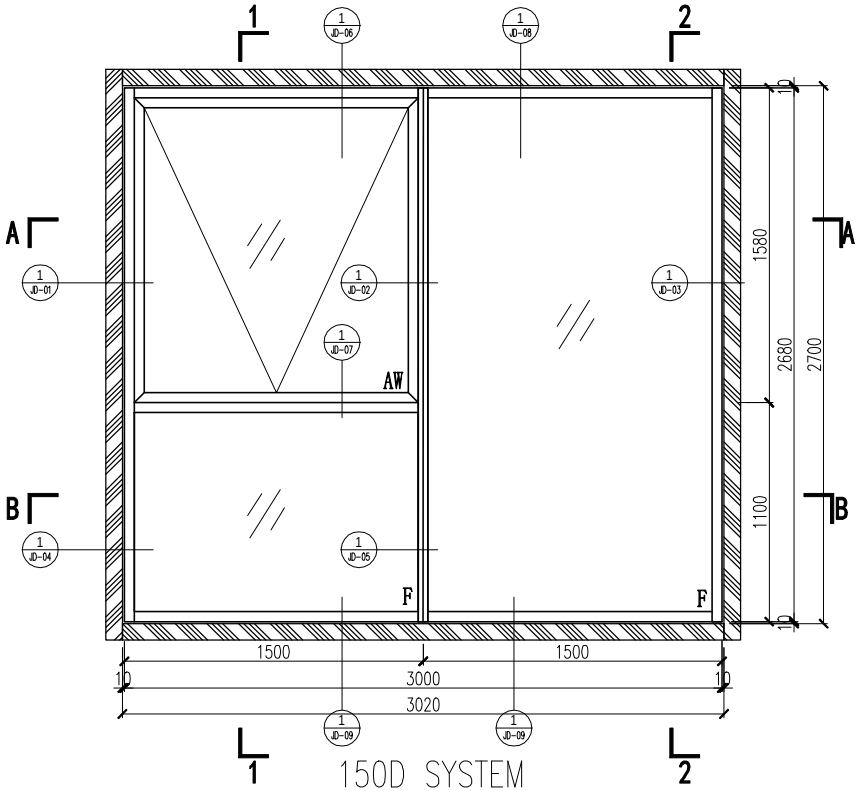
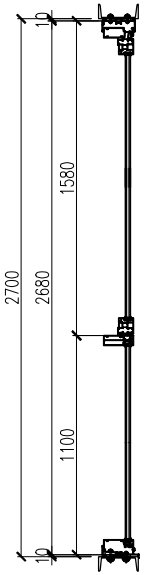
KETE WINDOW WALL
150D SYSTEM

2019.01.10





150D SYSTEM

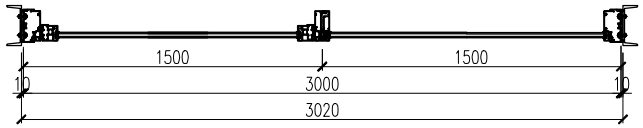


OUTSIDE

1-1 Section

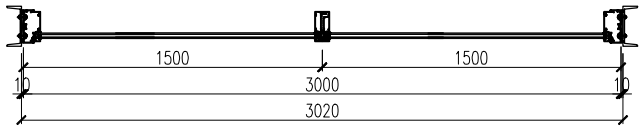
OUTSIDE

2-2 Section



OUTSIDE

A-A Section



OUTSIDE

B-B Section

GL01:8MM TOUGHENED HEAT SOAKED+12AIR(SEALANT)+8MM TOUGHENED HEAT SOAKED

设计变更	
日期	变更内容

备注:
Notes

1. 图上所有尺寸以标注为准，勿以度量。
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工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	PARTIAL FLAT ELEVATION -150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	DY-101A
修改序号 Revision No.	R 0

MATERIAL LIST

NO.	DRAWING NO.	Rev.	DRAWING TITLE
1	M-01	R0	MATERIAL LIST-150D
2	M-02	R0	MATERIAL LIST-150D
3	M-03	R0	MATERIAL LIST-150D
4	M-04	R0	MATERIAL LIST-150D

WINDOW WALL DETAIL DRAWING LIST

NO.	DRAWING NO.	Rev.	DRAWING TITLE
1	DY-101A	R0	PARTIAL FLAT ELEVATION-150D

WINDOW WALL DETAIL DETAILS DRAWING LIST

NO.	DRAWING NO.	Rev.	DRAWING TITLE
1	JD-01	R0	DETAIL-150D
2	JD-02	R0	DETAIL-150D
3	JD-03	R0	DETAIL-150D
4	JD-04	R0	DETAIL-150D
5	JD-05	R0	DETAIL-150D
6	JD-06	R0	DETAIL-150D
7	JD-07	R0	DETAIL-150D
8	JD-08	R0	DETAIL-150D
9	JD-09	R0	DETAIL-150D
10	JD-10	R0	DETAIL-150D

设计变更	
日期	变更内容

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工程名称 Project Name: KETE WINDOW WALL 150D SYSTEM

工程编号 Project No.:

图 名 Drawing Name: DIRECTORY-150D

设 计 Design: ZIJIAN

审 核 Check: KIM

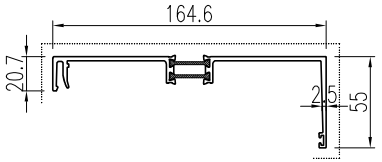
批 准 Approve: JOHN

日 期 Scale: 2019.01.10

图纸编号 Drawing No.: DL-01

修改序号 Revision No.: R 0

DIE SCHEDULE



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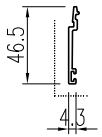

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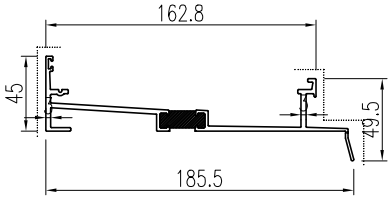

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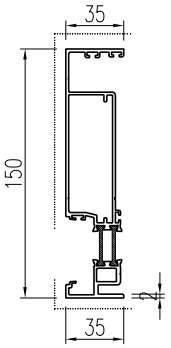

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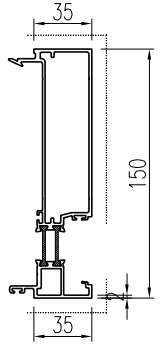

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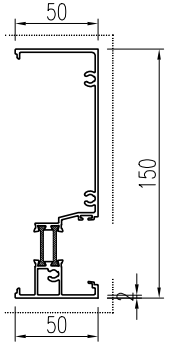

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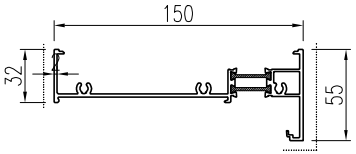

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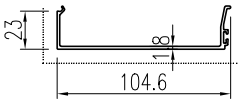

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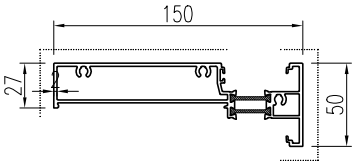

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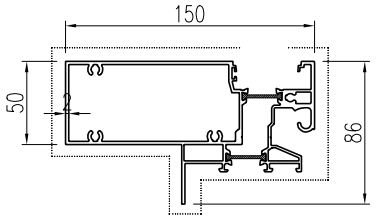

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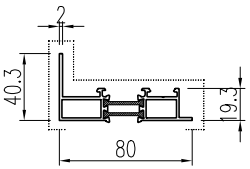

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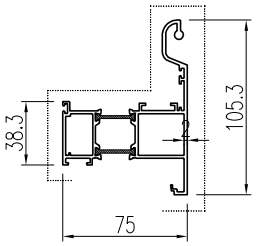

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KTGR150-10	6063-T5	POWDERCOAT	SASH FRAME		1:1

设计变更

日期	变更内容

备注:
Notes

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工程名称 Project Name: KETE WINDOW WALL 150D SYSTEM

工程编号
Project No.

图 名 Drawing Name: MATERIAL LIST-150D

设 计 Design: ZIJIAN

审 核 Check: KIM

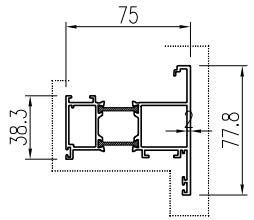
批 准 Approve: JOHN

日 期 Scale: 2019.01.10

图纸编号 Drawing No.: M-01

修改序号 Revision No.: R 0

DIE SCHEDULE



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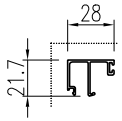

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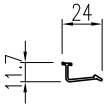

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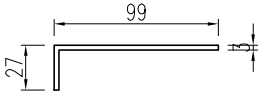

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设计变更	
日期	变更内容

备注:
Notes

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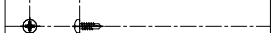
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	MATERIAL LIST-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	M-02
修改序号 Revision No.	R 0

MATERIAL LIST

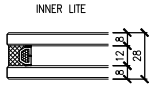
FASTENERS SCHEDULE

LEGEND NO.	FASTENER COMPONENT	DESCRIPTION
F01		M8X40mm PAN HEAD SCREW 304 STAINLESS STEEL GR. A2-50 @600mm
F02		st5.5X38 PAN-HEAD SELF DRILLING SCREW 304 STAINLESS STEEL GR. A2-50
F03		st4.2x22 COUNTERSUNK HEAD SELF DRILLING SCREW 304 STAINLESS STEEL GR. A2-50 @≤300mm
F04		st4.2x50 COUNTERSUNK HEAD SELF DRILLING SCREW 304 STAINLESS STEEL GR. A2-50 @≤300mm
F05		st4.2x32 PAN-HEAD SELF DRILLING SCREW 304 STAINLESS STEEL GR. A2-50
F06		ST4.2x13 PAN HEAD DRILLING TAPPING SCREW 304 STAINLESS STEEL GR. A2-50
F07		st4.2x13 PAN-HEAD SELF DRILLING SCREW 304 STAINLESS STEEL GR. A2-50

MISC BLOCK

LEGEND NO.	PROFILE	DESCRIPTION
MB01		ø12mm COMPRESSED CLOSED CELL BACKING ROD MATERIAL:POLYETHELENE BY INSTALLER ON SITE
MB02		WEATHER SEAL (CONTINUOUS) GUIBAO 998
MB03		120mmx10mm , L=100mm SILICONE SETTING BLOCK HARDNESS SHORE A :85±5 COLOR BLACK
MB04		30mmx6mm , L=100mm SILICONE SETTING BLOCK HARDNESS SHORE A :85±5 COLOR BLACK
MB05		ø12 HOLE COVER EPDM COLOR BLACK
MB06		PVC CAPPING HARDNESS SHORE A :70±5 COLOR BLACK

GLASS

LEGEND NO.	PROFILE	DESCRIPTION
GL01		8mm TOUGHENED HEAT SOAKED +12AIR(SEALANT) + 8mm TOUGHENED HEAT SOAKED

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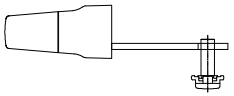
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	M-03
修改序号 Revision No.	R 0

MATERIAL LIST

Rubber strip

LEGEND NO.	FASTENER COMPONENT	DESCRIPTION
GK01		COLOR:BLACK MATERIAL:EPDM RUBBER HARDNESS SHORE A :65±5A
GK02		COLOR:BLACK MATERIAL:EPDM RUBBER HARDNESS SHORE A :65±5A
GK03		COLOR:BLACK MATERIAL:EPDM rubber HARDNESS SHORE A :65±5A
GK04		COLOR:BLACK MATERIAL:EPDM rubber HARDNESS SHORE A :65±5A
GK05		COLOR:BLACK MATERIAL:EPDM complex rubber HARDNESS SHORE A :65±5A 45±5A

MISC BLOCK

LEGEND NO.	PROFILE	DESCRIPTION
HF01		WINDOW HANDLE CODE: CZS120 COLOR BLACK WITHOUT KEY
HF02		RESTRICTOR STAYS CODE: SC400-10 304 STAINLESS STEEL

设计变更	
日期	变更内容

备注:
Notes

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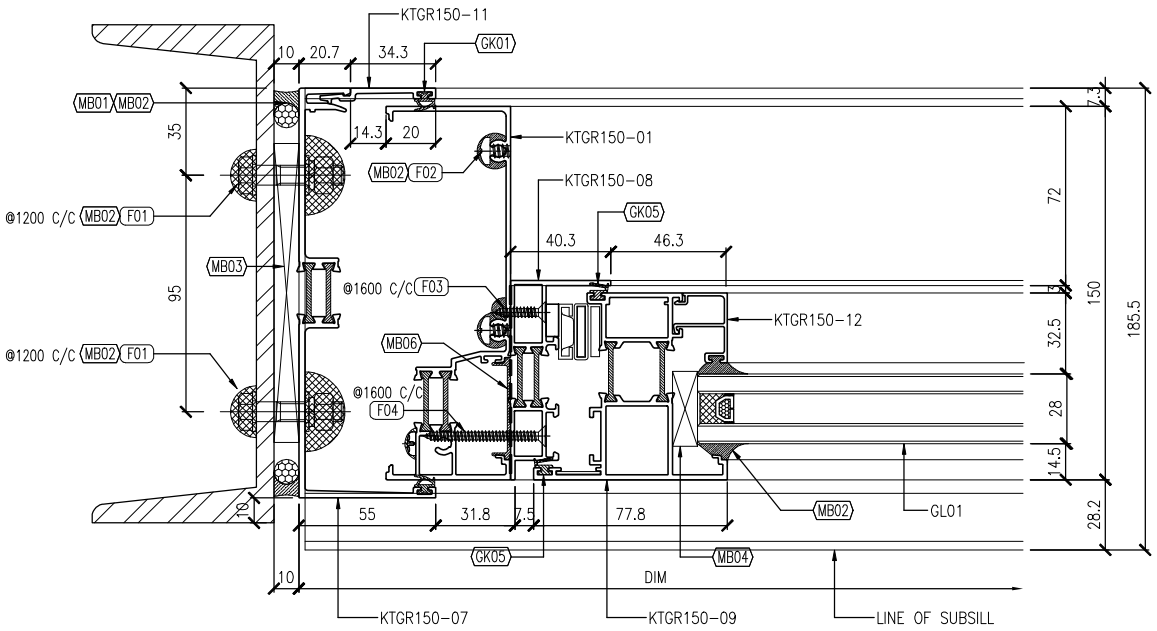
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	MATERIAL LIST-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	M-04
修改序号 Revision No.	R 0



OUTSIDE

①

设计变更	
日期	变更内容

备注:
Notes

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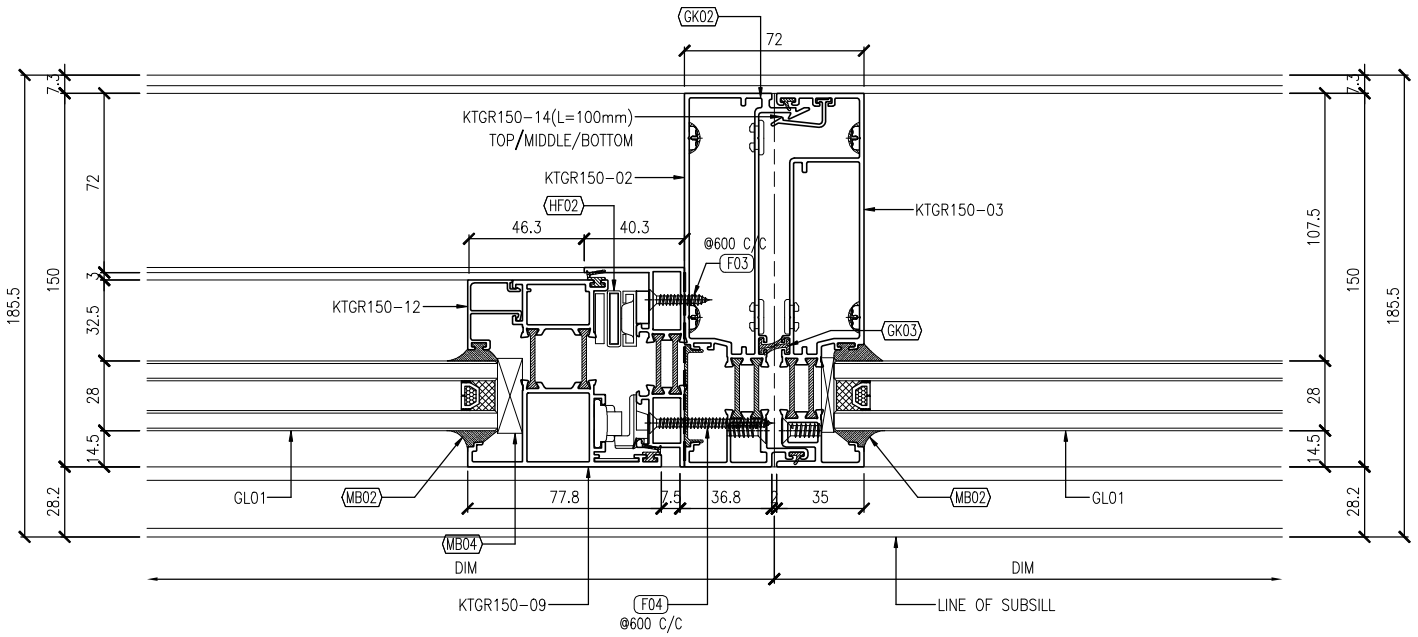
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-01
修改序号 Revision No.	R 0



OUTSIDE

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设计变更	
日期	变更内容

备注:
Notes

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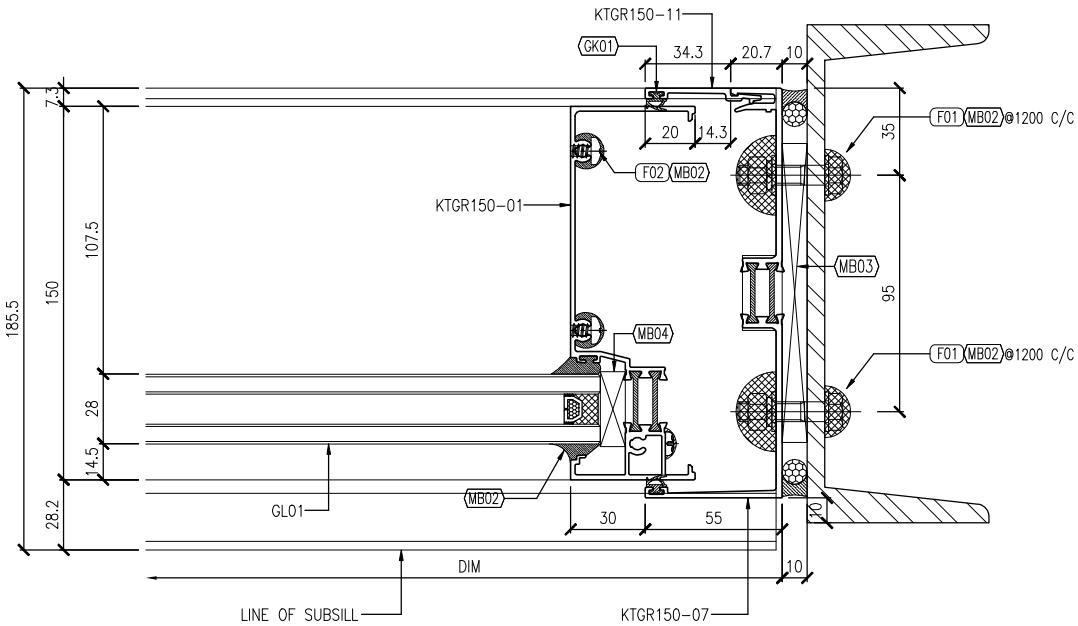
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-02
修改序号 Revision No.	R 0



OUTSIDE

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设计变更	
日期	变更内容

备注:
Notes

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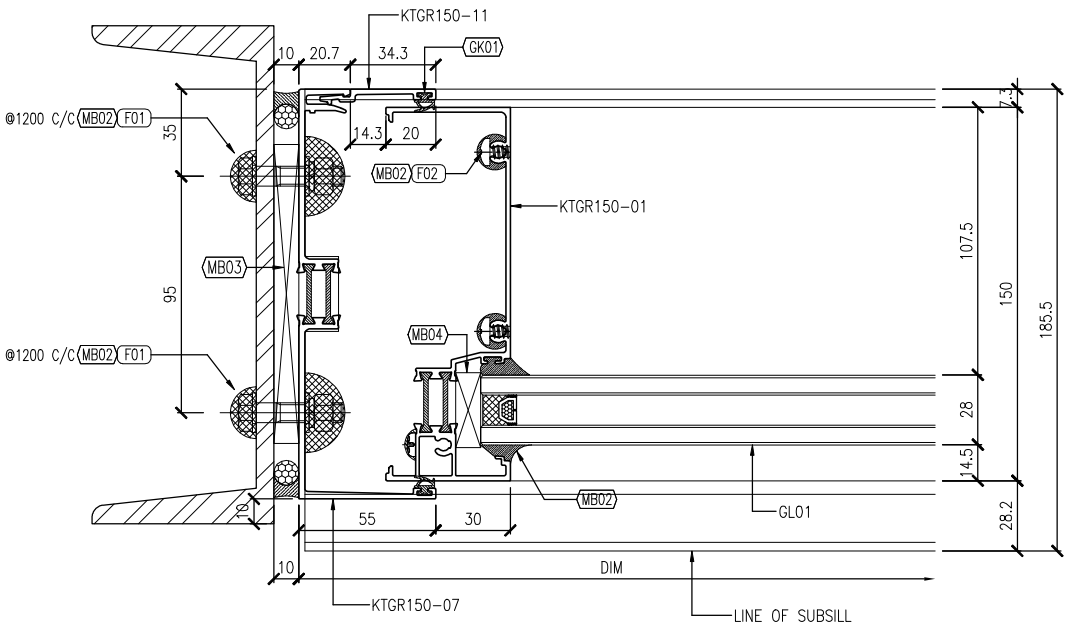
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-03
修改序号 Revision No.	R 0



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设计变更	
日期	变更内容

备注:
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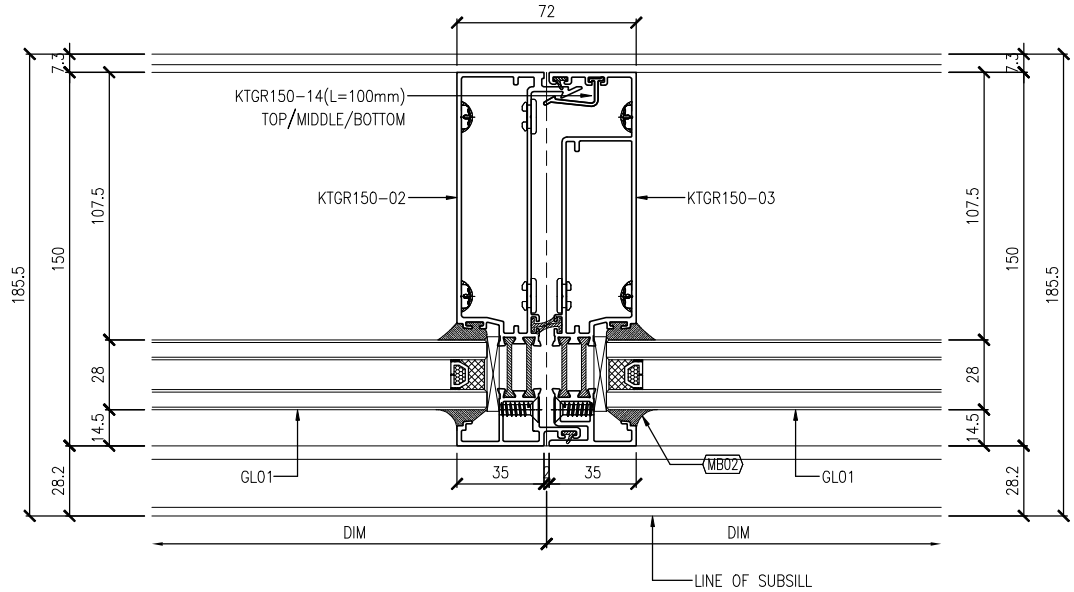
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-04
修改序号 Revision No.	R 0



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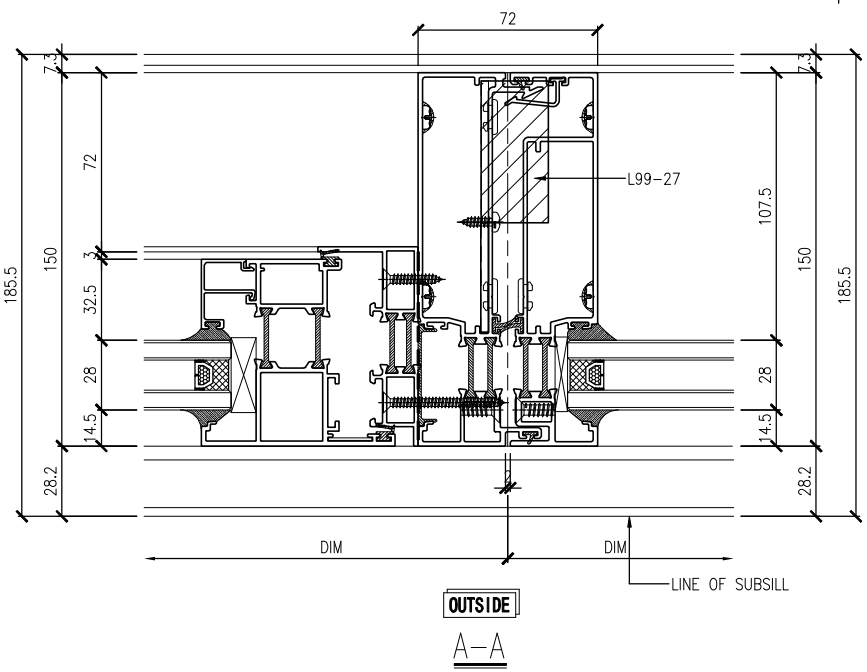
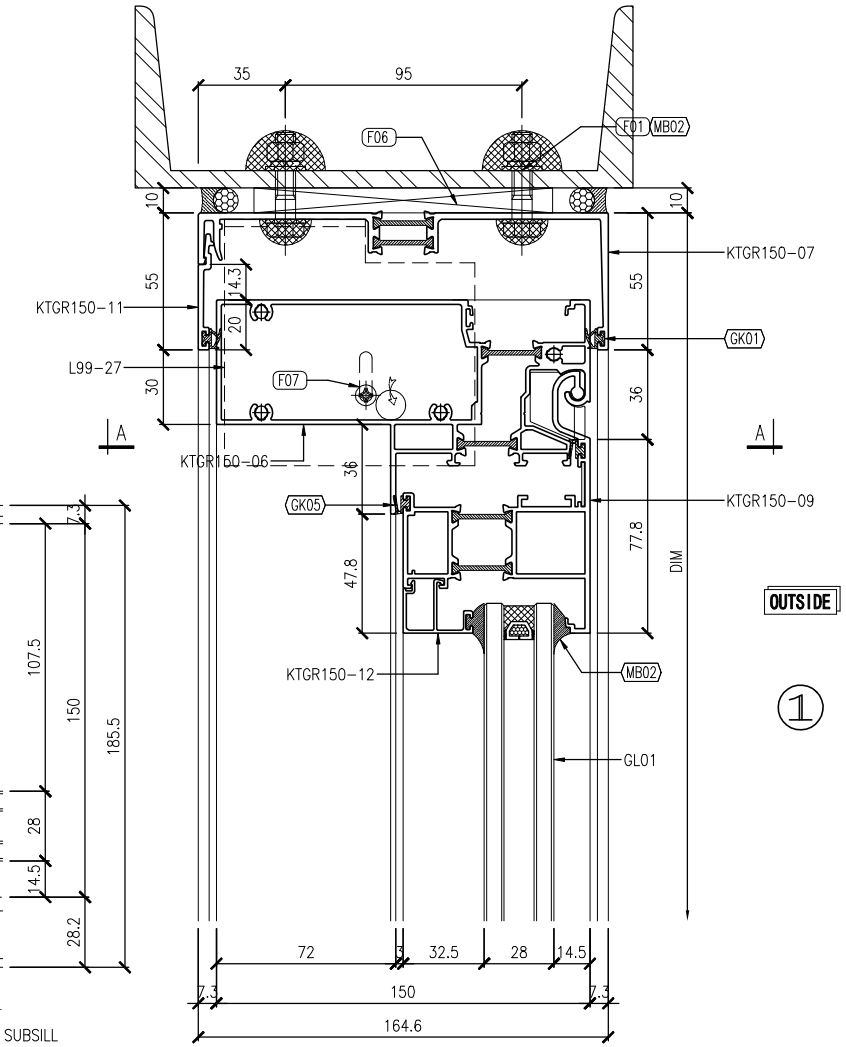
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-05
修改序号 Revision No.	R 0



A–A



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日期	变更内容

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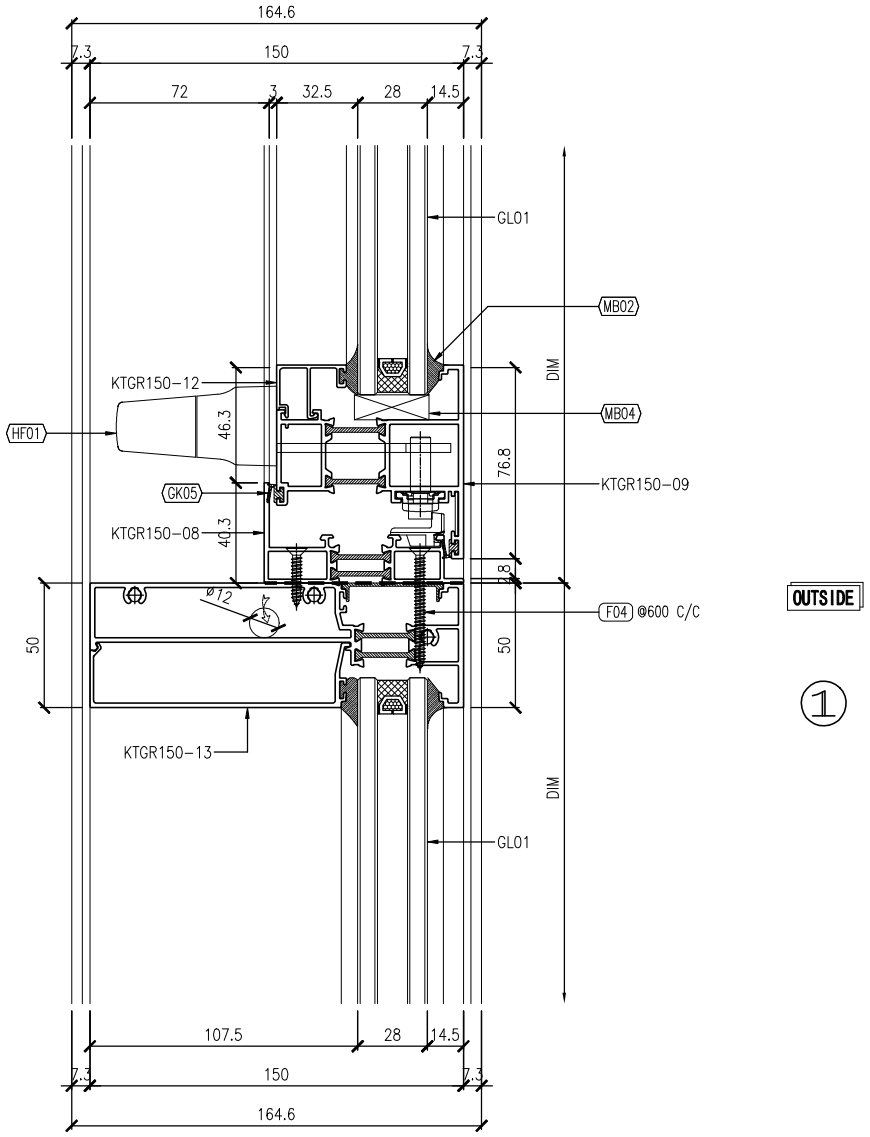
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-06
修改序号 Revision No.	R 0



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日期	变更内容

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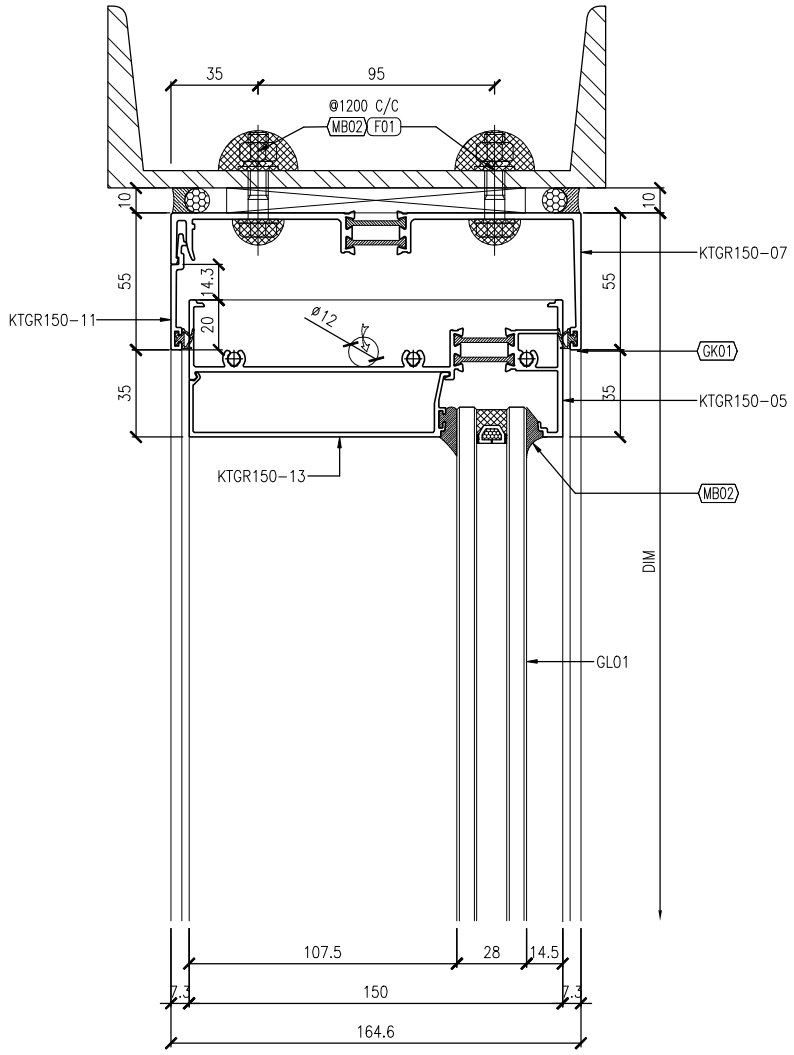
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-07
修改序号 Revision No.	R 0



OUTSIDE

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日期	变更内容

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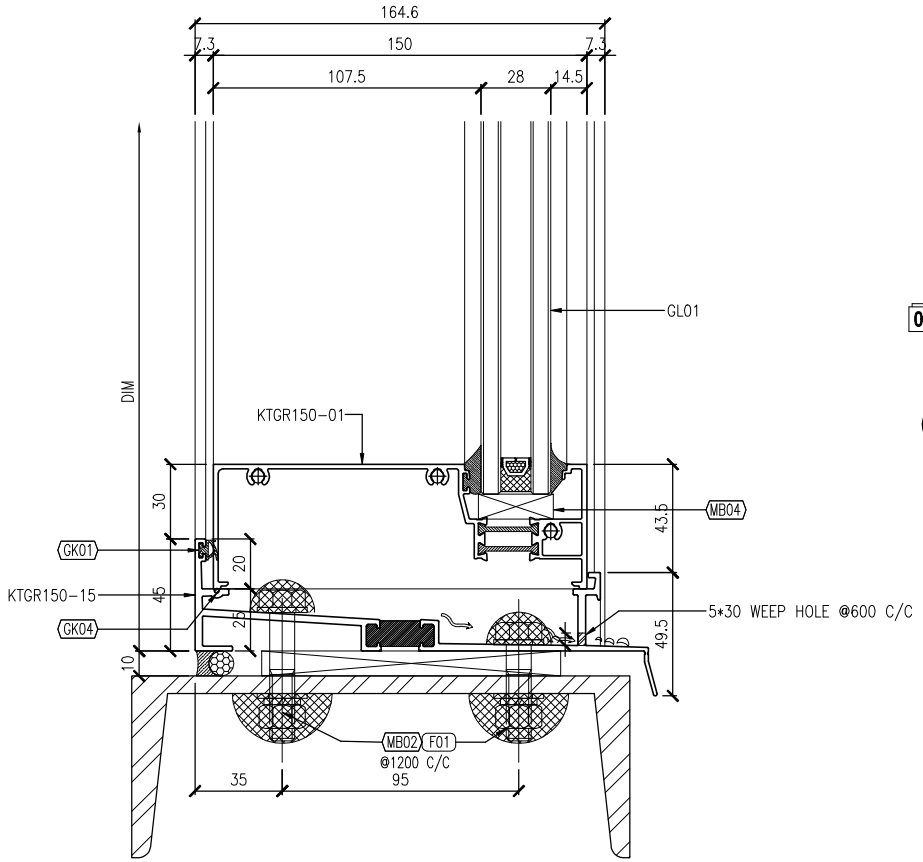
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-08
修改序号 Revision No.	R 0



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设计变更	
日期	变更内容

备注:
Notes

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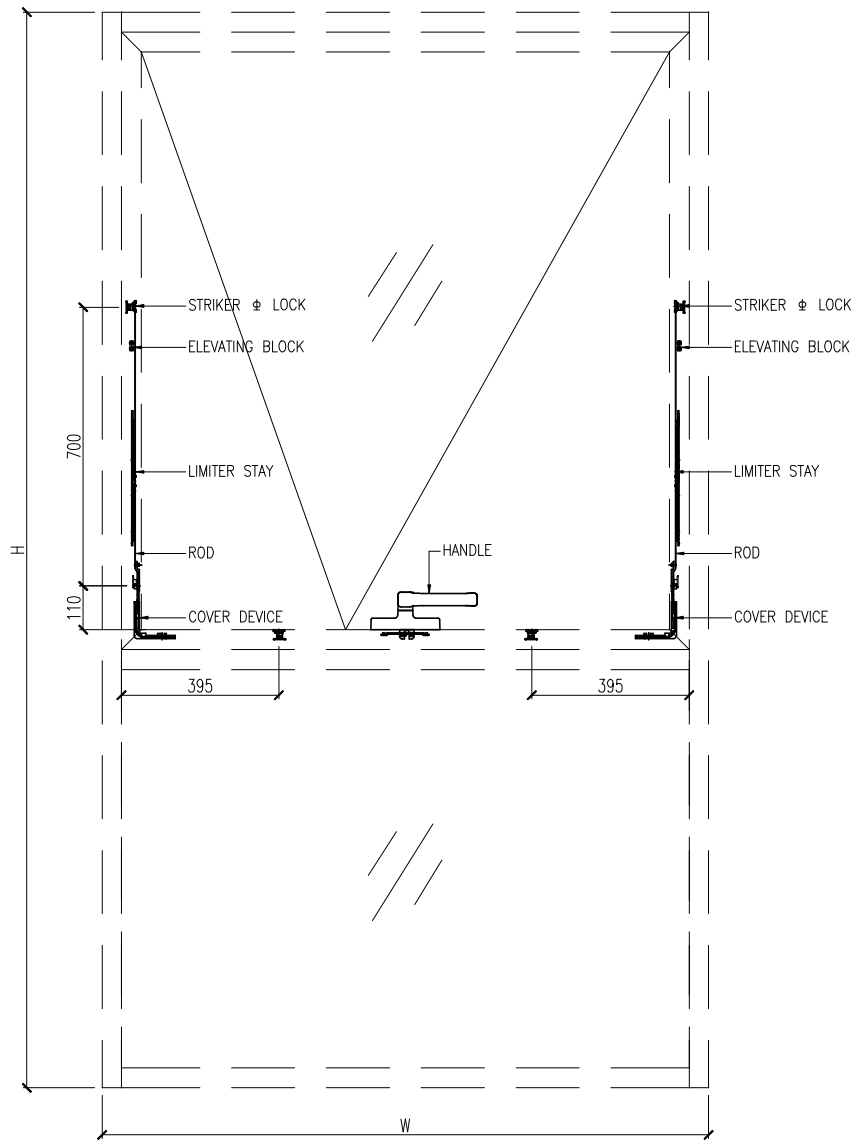
工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-09
修改序号 Revision No.	R 0



IRONMONGERY DISTRIBUTION DIAGRAM OF TOP HUNG WINDOW

设计变更	
日期	变更内容

备注:
Notes

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工程名称 Project Name	KETE WINDOW WALL 150D SYSTEM
工程编号 Project No.	
图 名 Drawing Name	DETAIL-150D
设 计 Design	ZIJIAN
审 核 Check	KIM
批 准 Approve	JOHN
日 期 Scale	2019.01.10
图纸编号 Drawing No.	JD-10
修改序号 Revision No.	R 0