

Consortium SML, SMOG, SMOA, SMT, STE (TH), BOZ
c/o Siemens Mobility Ltd. Thailand, Rama IX Road, Bangkok 10310

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Orange Line Project Office
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Your letter of OR-OS-ENGM-00247
Our reference ORL-SMO-CK-SCL_20250805_10
Date: 05-Aug-2025

Protection Class: RESTRICTED

**Re : MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) Section
M&E Equipment Contract**

Subject: Submission No. PSD-40002.B

Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

Response to CK Comment Review Sheet (CRS) on PSD-40002.A

Dear Sirs,

Please find attached the above-mentioned submission for your approval.

This submission is for: (check as applicable)

- | | | |
|--|---|--|
| <input type="checkbox"/> Outline Design | <input type="checkbox"/> Definitive Design | <input type="checkbox"/> Detailed Design |
| <input type="checkbox"/> Manufacturing | <input checked="" type="checkbox"/> Factory Acceptance Test (FAT) | <input type="checkbox"/> Installation |
| <input type="checkbox"/> On-Site Testing/Commissioning | <input type="checkbox"/> System Integration Test | <input type="checkbox"/> O&M Documentation |
| <input type="checkbox"/> As-Built Documentation | <input type="checkbox"/> General Documentation | <input type="checkbox"/> ToT & Training |
| <input type="checkbox"/> Other | | |

With kind regards,

Ingo Bischof
Project Director

On behalf of Jessica Doebring
Acting Commercial Project Director

Enclosures:

List of Documents applicable to Sub-contractor Submission No. PSD-40002.B

List No.	Document Number	Title	No. of Pages
01		Response to Comment Review Sheet	29 A4
02	ORL-STE-PSD-PRC-40000002_B	Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	134 A4

COMMENTS REVIEW SHEET
MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C1	28/4/2025 13:43:56	-	General	Pursuant to the relevant clause of the Conditions of Contract, do we need to approve the appointment of the subcontractor for manufacture of PSD in prior to start the prototype testing? The manufacturer profile and list of reference projects are required. Please elaborate more.		A01	2	Anat Uamcharoen	In pursuant to the Condition of Contract, STE will seek CK/BEM written approval for major subcontractor for manufacturing of PSD for stations.	Aphiwut Roekwian	Open
C1	27/5/2025 11:05:40	-	General	Noted. The vendors selection is not finalized.		A	1	Anat Uamcharoen			Closed

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C2	28/4/2025 13:56:34	3	Annexes	3 Annexes - Annex E – Punch List is missing in Table 11 : List of Annexes.		A01	3	Anat Uamcharoen	Added in Rev. A, Table 11	Aphiwut Roekwianng	Open
C2	27/5/2025 11:06:06	3	Annexes	Acknowledged.		A	1	Anat Uamcharoen			Closed

COMMENTS REVIEW SHEET
MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C3	28/4/2025 13:57:38	3	Annexes	3 Annexes - Please add the attendance sheet for recording the testers and witness.		A01	3	Anat Uamcharoen	Added in Rev. A, Annex F	Aphiwut Roekwianng	Open
C3	27/5/2025 11:06:41	3	Annexes	Acknowledged		A	1	Anat Uamcharoen			Closed

COMMENTS REVIEW SHEET
MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C4	28/4/2025 14:07:33	-	General	<p>2.2.4 HHPSD Accelerated Life Cycle Inspection</p> <p>2.3.4 FHPSD Accelerated Life Cycle Inspection</p> <p>To monitor continuous testing in Singapore effectively, surveillance CCTV for remote monitoring is required. CCTV camera(s) shall be placed to capture relevant areas and ensure they have good coverage of the testing activities.</p>		A01	3	Anat Uamcharoen	Updated in Section 2.2.4 & 2.3.4.	Aphiwut Roekwian	Open
C4	27/5/2025 11:07:41	-	General	Acknowledged		A	1	Anat Uamcharoen			Closed

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C5	28/4/2025 14:20:51	2.1	Test Configuration	<p>2.1 Test Configuration</p> <p>The drawings of HHPSD/FHPSD Test stand with the detailed dimensions shall be provided for visual inspection and measurement.</p> <p>Refer to Figure 1 : HHPSD Prototype Setup, it seems that the test stand is fixed on the wheels, right</p>		A01	3	Anat Uamcharoen	Parts with detailed drawing is added into Annex G HHPSD test stand is fixed on the jig with wheels as base.	Aphiwut Roekwiang	Open
C5	27/5/2025 11:08:10	2.1	Test Configuration	Acknowledged		A	1	Anat Uamcharoen			Closed

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MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C6	28/4/2025 14:29:55	2.1	Test Configuration	2.1 Test Configuration Figure 1 : HHPSD Prototype Setup and Figure 2 : FHPSD Prototype Setup, please provide the figures for both sides (front and back viewpoint). PSI for FHPSD is not shown.		A01	3	Anat Uamcharoen	PSI for FHPSD is added into Rev A Figure 3	Aphiwut Roekwian	Open
C6	27/5/2025 11:08:34	2.1	Test Configuration	Acknowledged		A	1	Anat Uamcharoen			Closed

COMMENTS REVIEW SHEET
MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. :	PSD-40002	Revision :	A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C7	28/4/2025 14:37:50	A-	A-6 – HHPSD Door Operation Mode Tes	A-6 – HHPSD Door Operation Mode Test DLCP shall be tested also (same as the typical LCP).		A01	3	Anat Uamcharoen	Updated in Appendix A-6	Aphiwut Roekwianng	Open
C7	27/5/2025 11:08:53	A-	A-6 – HHPSD Door Operation Mode Tes	Acknowledged		A	1	Anat Uamcharoen			Closed

COMMENTS REVIEW SHEET
MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C8	28/4/2025 14:38:51	C-	C-6 – FHPSD Door Operation Mode Tes	C-6 – FHPSD Door Operation Mode Test DLCP shall be tested also (same as the typical LCP).		A01	3	Anat Uamcharoen	Updated in Appendix C-6.	Aphiwut Roekwianng	Open
C8	27/5/2025 11:09:09	C-	C-6 – FHPSD Door Operation Mode Tes	Acknowledged		A	1	Anat Uamcharoen			Closed

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C9	28/4/202 5 14:41:06	A-1	A-12 – HHPSD EED Test	A-12 – HHPSD EED Test EED isolation shall be tested.		A01	3	Anat Uamcha roen	Updated in Appendix A-12.	Aphiwut Roekwia ng	Open
C9	27/5/202 5 11:09:30	A-1	A-12 – HHPSD EED Test	Acknowledged		A	1	Anat Uamcha roen			Closed

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C10	28/4/202 5 14:42:08	C-1	C-12 – FHPSD EED Test	C-12 – FHPSD EED Test EED isolation shall be tested.		A01	3	Anat Uamcha roen	Updated in Appendix C-12.	Aphiwut Roekwia ng	Open
C10	27/5/202 5 11:09:44	C-1	C-12 – FHPSD EED Test	Acknowledged		A	1	Anat Uamcha roen			Closed

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C11	28/4/202 5 14:45:24	2.2.1	2.2.1 HHPSD Physical Chec	2.2.1 HHPSD Physical Check The drawing regarding to reserved area for the advertising panel shall be provided for checking and measuring the possible area.		A01	3	Anat Uamcha roen	LCD Enclosure detailed drawing is added into Annex G Dimension updated in Test ID : ST-1000.	Aphiwut Roekwia ng	Open
C11	27/5/202 5 11:10:20	2.2.1	2.2.1 HHPSD Physical Chec	Acknowledged		A	1	Anat Uamcha roen			Closed

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C12	27/5/2025 5 11:13:26	1.4.3	Reference Documents	1.4.3 Reference Documents Table 4 : List of Documents, PSD-40001 PSD - Subsystem Test Plan shall be included.		A	3	Anat Uamcharoen	Updated in Rev. B, Table 4 : List of Documents.	Aphiwut Roekwianng	Open
C13	5/6/2025 17:40:50	2	Test Overview / Test Description	Please edit the sentence, "The tests contained in Table 5 : HHPSD Prototype Test and Table 6 : FHPSD Prototype Test will be performed during the prototype test." (MNT-PSD)		A	2	Admin Om	Updated in Rev. B, section 2.	Aphiwut Roekwianng	Open

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C14	5/6/2025 17:42:02	2.1	"Test Configuration Table 7"	From figure 3, please specify how the counter will be display. (MNT-PSD)		A	2	Admin Om	There will be a counter on the front panel of the simulator box. Refer to Figure 4 Signalling Interface Simulator drawing.	Aphiwut Roekwiang	Open
C15	5/6/2025 17:42:31	2.1	Test Configuration	Please specify the FS type in equipment setup. (MNT-PSD)		A	2	Admin Om	FS type used is FS4, 1725mm in width. The prototype/test stand design is described in PSD-20008 PSD Test Stand.	Aphiwut Roekwiang	Open

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C16	5/6/2025 17:43:43	2.1	Test Configuration	Based on PPL experience, we have observed that the use of a force gauge meter alone may lead to inconsistent readings due to variability in personal insertion force. To improve measurement reliability and accuracy, we recommend the use of a dual-measurement approach, combining the force gauge meter with an auxiliary device such as a pinch force meter. This combination provides cross-verification and helps mitigate human-dependent variability during force application. Please comment. (MNT-PSD)		A	3	Admin Om	Based on our experience, we are able to measure the force accurately using a force gauge without any issues. To mitigate human error, the force gauge with the optional handle will be used, as discussed during the workshop	Aphiwut Roekwia ng	Open
C17	5/6/2025 17:44:10	2.2.2.1	HHPSD Insulation/Bonding Test on Prototype	Please explain why the insulation value for test stand is 5 kOhm and please add standard for reference. (MNT-PSD)		A	2	Admin Om	Refer to SYE-03002 Overall Earthing and Bonding Concept Appendix E, the insulation value shall be at least 5kohm per 100m.	Aphiwut Roekwia ng	Open

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C18	5/6/2025 17:44:43	2.2.2.1	HHPSD Insulation/Bonding Test on Prototype	Please specify more detail about testing point (both for insulation test and continuity test), for each point from A to F, which exact part/component need to be clamp? (MNT-PSD)		A	2	Admin Om	Updated Annex A-4.	Aphiwut Roekwiang	Open
C19	5/6/2025 17:45:19	Annex A-6	HHPSD Door Operation Mode Test FHPSD Door Operation Mode Test	4,5,6,7 TS ID, Pass criteria shall include PSI status. (Blinking/Steady) (MNT-PSD)		A	2	Admin Om	Updated in Annex A-6 and C-6, also The LCKS key is removable check to Ref. 11.	Aphiwut Roekwiang	Open

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C20	5/6/2025 17:46:06	2.2.3.3	HHPSD Door Motion Profile FHPSD Door Motion Profile	Please provide an example of oscilloscope graph and specify the parameter of x&y axis. (MNT-PSD)		A	2	Admin Om	Added oscilloscope image for reference in section 2.2.3.3 and 2.3.3.3 for reference. Y-axis is voltage, x-axis is time.	Aphiwut Roekwia ng	Open
C21	5/6/2025 17:47:13	2.2.3.3	HHPSD Door Motion Profile FHPSD Door Motion Profile	Please elaborate how to connect linear encoder to the doors. (MNT-PSD)		A	2	Admin Om	Linear encoder is connected to the doors by attaching its scale to the moving part of doors, ensuring correct alignment and secure attachment.	Aphiwut Roekwia ng	Open

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C22	5/6/2025 17:47:59	2.2.3.3	HHPSD Door Motion Profile FHPSD Door Motion Profile	Please specify the measuring point of handheld tachometer. (MNT-PSD)		A	2	Admin Om	The handheld tachometer will be placed against ASD Gap Filler to measure the speed.	Aphiwut Roekwiang	Open
C23	5/6/2025 17:49:35	Annex A-7	HHPSD Door Motion Profile FHPSD Door Motion Profile	Please specify how to measure characteristic of door motion which shall match with the Open/Close profile graph in Definitive Design 20002 PSD - Operation Logic / Doorset Function, Topic 2.1.2.1 Also please elaborate the measurement of VO_low speed and VC_low speed. (MNT-PSD)		A	3	Admin Om	When measuring the opening and closing time, the door profile will reflect on the oscilloscope. Refer to the added oscilloscope image in section 2.2.3.3 and 2.3.3.3. Measure of VO_low speed and VC_low speed is not required in the test procedure.	Aphiwut Roekwiang	Open

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C24	5/6/2025 17:50:44	2.2.3.4	HHPSD Obstacle Detection FHPSD Obstacle Detection	<p>From ORL TS PSD V07, "In the event that the doorset fails to close following 3 consecutive attempts, further doorset movement shall cease on the offending door. In the event that a door has stopped movement following this condition, further doorset closure shall require another activation of the door close command. The sliding screen doors shall not slam after removal of an obstruction or on loss of power supply."</p> <p>Please add test procedure, - After the door has stopped, when A new close command is apply, the door shall close back normally</p>	ORL TS	A	3	Admin Om	Updated Annex A-5, A-8, C-5 and C-8 to include giving new command after ASD is ceased.	Aphiwut Roekwia ng	Open
C25	5/6/2025 17:51:47	2.2.3.5	HHPSD Portable Test Unit FHPSD Portable Test Unit	<p>From CRS of Definitive Design 20001 as below figure, more PTU function will be elaborate in O&M manual.</p> <p>Please specify how to test these PTU's remain function. (MNT-PSD)</p>		A	3	Admin Om	Critical functions of PTU are included in the test procedure. For the Non-critical function will be demonstate during the O&M training(PSD-90003).	Aphiwut Roekwia ng	Open

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No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C26	5/6/2025 17:52:18	Annex A	HHPSD Acoustic Test	Please specify the reference of 58 and 73 dBA. (MNT-PSD)		A	2	Admin Om	Ambient noise db is set from previous experience. Normal ambient db value sits around 50-70. The max. allowable noise from PSD is limited to 73 dB by design. This noise level is below the recommended noise level threshold by WHO - 80 db (40 hrs / week), NIOSH - 85 db (8 hrs) and OSHA - 90 db (8 hrs).	Aphiwut Roekwia ng	Open
C27	5/6/2025 17:52:47	Annex A	HHPSD ERM Manual Release Mechanism Test	Please specify the reference of 67 and 133 N. (MNT-PSD)		A	2	Admin Om	Reference is from NFPA 130 , 7.2.1.4.5.2 for 67N force for push force of ERM/panic bar 5.3.10.2(2) and for 133N force for pushing the door open.	Aphiwut Roekwia ng	Open

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C28	5/6/2025 17:53:34	2.2.4	HHPSD Accelerated Life Cycle Inspection Table 8 FHPSD Accelerated Life Cycle Inspection Table 9	For Drive Unit and Mechanism check point, Please include stopper pin as component to be checked. (MNT-PSD)		A	3	Admin Om	we have locking pin in our mechanism and it is included in the test procedure. The stopper condition check added to test procedure.	Aphiwut Roekwia ng	Open
C29	5/6/2025 17:54:27	2.2.4	HHPSD Accelerated Life Cycle Inspection Table 8 FHPSD Accelerated Life Cycle Inspection Table 9	Please specify all the PM tasks that will be performed during the stoppage. (MNT-PSD)		A	2	Admin Om	The checks outlined in the table will be carried out and replaced only if they are significantly out of specification. No specific preventive maintenance tasks will be included. If any preventive maintenance activity is required during the process, it shall be recorded as an event log.	Aphiwut Roekwia ng	Open

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C30	5/6/2025 17:55:02	Annex B-7	Event Log	Please elaborate more detail on pass criteria for event log. Does this mean that from the start until finish 1 million cycle test finish, there shall not be any error log on HMI? (MNT-PSD)		A	2	Admin Om	During 1 million cycle test, should not have any fatal alarm record in HMI or error log.	Aphiwut Roekwian	Open
C31	20/6/2025 14:07:59	2 Test	2.2.4 HHPSD Accelerated Life Cycle Inspection	Kindly clarify whether the inspection at 250,000, 500,000, 750,000, and 1,000,000 cycles during the HHPSD Accelerated Life Cycle Inspection will be conducted onsite or remotely via online inspection.		A	2	Admin Pcor	BEM, CK, MRTA, PCOR will be invited for online inspections at 250,000, 500,000, 750,000, and 1,000,000 cycles. More details for remote inspection and any key takeaways will be elaborated during prototype testing. Please refer to BEM/M/ORM/00107/68 dated 16/07/2025 and BEM/M/ORM/00110/68 dated 22/07/2025, for the notice of onsite inspection of PSD prototype test.	Aphiwut Roekwian	Open

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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C32	20/6/202 5 14:08:20	2 Test	"2.8.2 Test Personnel / A-1 Test Commencement "	Please revise the designation of MRTA in Table 10: Table of Personnel / Skill Requirements and A-1 Test Commencement to be consistent. The document currently refers to MRTA as "Observer" in Table 10, and as "Witness" in A-1. The terminology should be aligned.		A	2	Admin Pcor	Updated Table 10 MRTA to witness.	Aphiwut Roekwia ng	Open
C33	20/6/202 5 14:08:59	3 Annexes	"A-2 Test Equipment Check / A-9 HHPSD Portable Test Unit / C-9 FHPSD Portable Test Unit"	Please specify the PTU software version used during the test		A	2	Admin Pcor	Updated Annex A-9 and C-9 step 2 to include recording of PTU software version.	Aphiwut Roekwia ng	Open

COMMENTS REVIEW SHEET

MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C34	20/6/202 5 14:09:17	3 Annexes	"A-3 HHPSD Visual Inspection and Dimension Check / C-3 FHPSD Visual Inspection and Dimension Check"	It is recommended to include inspection criteria to verify that no abrupt irregularities or sharp edges are present, in order to ensure safety and avoid potential injury during operation and maintenance.		A	2	Admin Pcor	Added in A3 and C3 table.	Aphiwut Roekwia ng	Open
C35	20/6/202 5 14:09:38	3 Annexes	"A-3 HHPSD Visual Inspection and Dimension Check / C-3 FHPSD Visual Inspection and Dimension Check"	Please consider adding inspection criteria to verify that the color of coating matches the approved color code and that there are no cracks or damages on the coating surface.		A	2	Admin Pcor	Added in A3 and C3 table.	Aphiwut Roekwia ng	Open

COMMENTS REVIEW SHEET

MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C36	20/6/202 5 14:09:55	3 Annexes	"A-3 HHPSD Visual Inspection and Dimension Check / C-3 FHPSD Visual Inspection and Dimension Check"	Please consider adding dimension inspection for other related components such as Crowd Guide, Anti-Climb, and Rear Cover to ensure dimensional compliance with the approved design.		A	2	Admin Pcor	Added in A3 and C3 table.	Aphiwut Roekwia ng	Open
C37	20/6/202 5 14:10:14	3 Annexes	"A-8 HHPSD Obstacle Detection / C-8 HHPSD Obstacle Detection"	For the Obstacle Detection test, it is recommended to include additional verification on other related components such as Crowd Guide and Anti-Climb, since there is a possibility of passenger entrapment in these areas as well.		A	2	Admin Pcor	Nosing rubber would be the first point of contact when door closes. Therefore the test should be carry out on the nosing rubber and not crowd guide and anti climber. More mitigation measures to manage the risk for passenger entrapment between the possible gap will be recorded in the Hazard log as usual.	Aphiwut Roekwia ng	Open

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MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C38	20/6/202 5 14:10:36	3 Annexes	Annex G – FHPSD & HHPSD Drawings	It is recommended to add drawing(s) for DLCP (Driver Local Control Panel) under Annex G – FHPSD & HHPSD Drawings, in order to complete the documentation and provide full reference for system		A	2	Admin Pcor	FHPSD & HHPSD DLCP drawing added into Annex G	Aphiwut Roekwia ng	Open
C39	20/6/202 5 14:10:52	General		Please provide the material specifications for all components. If such information has been specified in other documents, kindly clarify and provide the corresponding document references.		A	3	Admin Pcor	Material Specifications have been provided in PSD -20006 table 6(HHPSD) and table 7(FHPSD).	Aphiwut Roekwia ng	Open

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MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C40	20/6/2025 14:11:09	General		Please include a Prototype Setup Layout drawing to clearly illustrate the arrangement of equipment and components during the test setup.		A	2	Admin Pcor	Added into Annex G.	Aphiwut Roekwiang	Open
C41	20/6/2025 14:11:26	General		"Please clarify whether the Power Distribution Panel (PDP) is included in the inspection and testing scope. "		A	2	Admin Pcor	PDP is not included in this test procedure as the test procedure is focus on the functionality of the doors. PSD PDP will be tested during another FAT activity. Participants will be invited to join. Please refer to BEM/M/ORM/00107/68 dated 16/07/2025.	Aphiwut Roekwiang	Open

COMMENTS REVIEW SHEET

MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C42	20/6/202 5 14:11:41	2 Test		It is recommended to include a "Manual Operating Force Test (including Unlocking Force)" to verify that passengers can manually open and close the Prototype ASD and EED doors with acceptable effort. This test should cover both the unlocking force required to activate the manual release mechanism and the static force needed to complete the door movement.		A	2	Admin Pcor	This test has been written in A11 and A12 for HHPSD, C11 and C12 for FHPSD. It includes the proposed idea of force needed to manually open the ASD and EED. It also covers the unlocking force and the static force needed to complete the door movement.	Aphiwut Roekwia ng	Open
C43	20/6/202 5 14:11:57	2 Test		It is recommended to conduct a Mechanical Loading Test to assess the structural response and deflection of the platform screen door system and its panels under simulated maximum load conditions, such as crowd pressure and aerodynamic forces from passing trains.		A	2	Admin Pcor	The different load conditions are already accounted for in the structural analysis. Loading test report from previous test from previous tests will be submitted in PSD-40004 Test Report - PSD - Glass, Structural analysis HHPSD + FHPSD, IP. The comparisons will be done in this document.	Aphiwut Roekwia ng	Open

COMMENTS REVIEW SHEET

MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C44	20/6/202 5 14:12:18	2 Test		It is recommended to perform a pre-test verification of the PDP to ensure system readiness. This should include checking cable connections and securing (Cable Test), as well as verifying all output voltages from the PDP (Voltage Supply Test) before commencing the prototype testing.		A	2	Admin Pcor	PDP functions will be tested internally before prototype testing.	Aphiwut Roekwia ng	Open
C45	20/6/202 5 14:12:33	2 Test		It is recommended to conduct a brightness test for the PSI indicators to ensure that the illumination level is sufficient for clear visibility by train drivers under various operating conditions.		A	2	Admin Pcor	We can do a visual check when carrying out the test on prototype. PSI light are the same as the ones assembled in BLE. The brightness test and visibility test for the PSI indicators will be conducted during dynamic onsite test with the train crew on the actual vehicle (lead by RST).	Aphiwut Roekwia ng	Open

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MRT ORANGE LINE PROJECT – BANG KHUN NON – MIN BURI (SUWINTHAWONG) SECTION

Document No. : ORL-STE-PSD-PRC-40000002_A

Submission No. : PSD-40002	Revision : A	Overall Status	3
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Submission Title : Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

No.	Update	Chapter / Section No.	Submission Item	Comments	Specs Ref.	Rev.	Code	By	Response	By	Status
C46	20/6/202 5 14:12:47	2 Test		It is recommended to include a Weather Tightness Test to verify that the PSD system and its components can effectively prevent water ingress and withstand external weather conditions during operation.		A	2	Admin Pcor	IP rating type test certificates shall be provided under submission PSD-40004 Test Report - PSD - Glass, Structural analysis HHPSD + FHPSD, IP.	Aphiwut Roekwia ng	Open
C47	20/6/202 5 14:13:01	2 Test		It is recommended to include a Coating Test to measure the coating thickness		A	2	Admin Pcor	Coating thickness measurement is added into table A3 and C3.	Aphiwut Roekwia ng	Open

MRT Orange Line Project
Bang Khun Non - Min Buri (Suwinthawong) Section

Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle

Submission No.: PSD-40002.B

Prepared by :	Dong Yafei	PSD	05-Aug-2025	
Reviewed by :	Herh Peng Leng	PSD	05-Aug-2025	
Released by :	Aphiwut Roekwiang	PM	05-Aug-2025	

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Bang Khun Non - Min Buri (Suwinthawong) Section

Overview of Changes

Revision	Issue	Changed Chapters	Reason for Change
A01	28-Mar-2025	All	New Issue
A	23-May-2025	All	Update as per comments
B	05-Aug-2025	All	Update as per comments

Bangkok Expressway and Metro Plc.
CH.Karnchang Public Company Limited
Siemens Mobility / STE(TH) / Bozankaya

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05-Aug-2025

Platform Screen Doors
Test Procedure - PSD - Functional Prototype and
Accelerated Life Cycle

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Bang Khun Non - Min Buri (Suwinthawong) Section

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MRT Orange Line Project

Bang Khun Non - Min Buri (Suwinthawong) Section

1 Introduction

1.1 Purpose

The prototype test is the type test conducted before the production will proceed. This is to ensure that the function implement is as per required by the design and contract.

1.2 Scope

The accelerated life cycle test is the type test conducted before the production of the Operational and Maintenance Manual. The accelerate life cycle will check the endurance and physical wear and tear of mechanism over a period of operation.

A test report will be submitted for the MRTA's Representative's review within fourteen (14) days after completion of the test.

1.3 Terms and Definitions

The following terms are used in this document. Where they are relevant to other documents they will also be included in Project Glossary otherwise they will appear only in this document.

Abbreviation	Definition
ASD	Automatic Sliding Door
ATP	Automatic Train Protection
AMC	Actuator Motion Control
BMS	Building Management System
BS	British Standard
CANBus	Controller Area Network Bus
CASS	Controlled Access Security System
CCTV	Closed Circuit Television
DC	Direct Current
DCU	Door Control Unit
DLCP	Driver Local Control Panel
DMC	Drive Motion Control
DOI	Door Open Indicator
DOS	Door Out of Service Indicator
DTL	Direct Telephone Line
EN	European Norm

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Bang Khun Non - Min Buri (Suwinthawong) Section

Abbreviation	Definition
EED	Emergency Egress Doors
EOI	EED/EWD Open Indicator
EMC	Electromagnetic Compatibility
ERM	Emergency Release Mechanism
EWD	Emergency End Walkway Door
FDP	Fixed Driving Panel
FFL	Finish Floor Level
FMECA	Failure Mode, Effects and Criticality Analysis
FS	Fixed Screen
FHPSD	Full Height Platform Screen Door
HHPSD	Half Height Platform Screen Door
HW	Head Wall
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IHA	Interface Hazard Analysis
IP	Ingress Protection
ISO	International Organisation of Standardization
LCB	Local Control Box
LCP	Local Control Panel
LED	Light Emitting Diode
LH	Left Hand
LMB	Lower Mounting Bracket
LRU	Line Replaceable Units
LSA	Lightning Surge Arrestor
MIL	Military Standard
MPM	Major Project Milestone
MRTA	Mass Rapid Transit Authority of Thailand
MTTR	Mean Time To Repair
NFPA	National Fire Protection Association
O&M	Operations and Maintenance

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Abbreviation	Definition
O&MHA	Operations and Maintenance Hazard Analysis
PC	Personal Computer
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
PDP	Power Distribution Panel
PHA	Preliminary Hazard Analysis
PLC	Programmable Logic Controller
PSC	Platform Screen Doors Central Control Panel
PSD	Platform Screen Door
PSI	Platform Summary Indicators
PTU	Portable Test Unit
RAMS	Reliability, Availability, Maintainability and Safety
RCIL	Reliability Critical Items List
RFI	Request For Information
RH	Right Hand
SOR	Station Operation Room
SPFMA	System Performance and Failure Management Analysis
SSHA	Sub-system Hazard Analysis
TCL	Track Centerline
TOR	Top of Rail
TW	Tailwall
UV	Ultraviolet

Table 1 : Terms and Definitions

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	9 of 134
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Bang Khun Non - Min Buri (Suwinthawong) Section

1.4 References

1.4.1 Contract References

No.	Referenced document
[1.01]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Exhibit II: O&M General Performance Requirement, ORL OMGPR V06
[1.02]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Exhibit III: General Specification, ORL GS V07
[1.03]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Exhibit III: Technical Specification, Platform Screen Door, ORL TS PSD V07
[1.04]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Exhibit IV: Description of Platform Screen Door, ORL_M&E_2024Sep_6.2.7_PSD_K

Table 2 : Contract References

1.4.2 MRTA References

The following MRTA items are referenced from within this document.

No.	Referenced document
[2.01]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Volume III: MRTA's Requirements, Part 3: Requirements for M&E Works
[2.02]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Volume III: MRTA's Requirements, Part 4: Operation & Maintenance Requirements
[2.03]	MRT Orange Line Project, Bang Khun Non – Min Buri (Suwinthawong) M&E Equipment Contract, Volume IV: Outline Specifications, Part 4: Outline Specifications for M&E Works

Table 3 : MRTA References

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle Submission no.: PSD-40002.B Uncontrolled if printed out or copied	10 of 134
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MRT Orange Line Project

Bang Khun Non - Min Buri (Suwinthawong) Section

1.4.3 Reference Documents

The following documents are referenced in this document.

No.	Document Number	Document Description
[3.01]	PSD-20001	Definitive-Design – PSD Functional Description
[3.02]	PSD-20002	Definitive-Design – PSD Operation Logic / Doorset Function
[3.03]	PSD-20004	Definitive-Design – PSD Electrical System Description
[3.04]	PSD-20005	Definitive-Design – PSD Electrical Insulation, Continuity and Bonding Plan
[3.05]	PSD-20006	Definitive-Design – PSD Modules
[3.06]	PSD-20008	Definitive-Design – PSD Test Stand
[3.07]	PSD-40001	PSD - Subsystem Test Plan

Table 4 : List of Documents

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2 Test Overview / Test Description

The tests contained in Table 5 : HHPSD Prototype Test and Table 6 : FHPSD Prototype Test will be performed during the prototype test.

Test No.	Test Title	Annex	Duration
ST 1000	HHPSD Visual Inspection and Dimension Check	A-3	60 mins
ST 1010	HHPSD Insulation/Bonding Test on Prototype	A-4	20 mins
ST 1110	HHPSD PSC Functional Test	A-5	30 mins
ST 1120	HHPSD Door Operation Mode Test	A-6	30 mins
ST 1130	HHPSD Door Motion Profile	A-7	60 mins
ST 1140	HHPSD Obstacle Detection	A-8	15 mins
ST 1210	HHPSD Portable Test Unit	A-9	15 mins
ST 1310	HHPSD Acoustic Test	A-10	10 mins
ST 1410	HHPSD ERM Manual Release Mechanism Test	A-11	10 mins
ST 1510	HHPSD EED Test	A-12	10 mins

Table 5 : HHPSD Prototype Test

Test No.	Test Title	Annex	Duration
ST 5000	FHPSD Visual Inspection and Dimension Check	C-3	60 mins
ST 5010	FHPSD Insulation/Bonding Test on Prototype	C-4	20 mins
ST 5110	FHPSD PSC Functional Test	C-5	30 mins
ST 5120	FHPSD Door Operation Mode Test	C-6	30 mins
ST 5130	FHPSD Door Motion Profile	C-7	60 mins
ST 5140	FHPSD Obstacle Detection	C-8	15 mins
ST 5210	FHPSD Portable Test Unit	C-9	15 mins
ST 5310	FHPSD Acoustic Test	C-10	10 mins
ST 5410	FHPSD ERM Manual Release Mechanism Test	C-11	10 mins
ST 5510	FHPSD EED Test	C-12	10 mins

Table 6 : FHPSD Prototype Test

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2.1 Test Configuration

The function of the prototype should be conducted to ensure that it meet the requirement.

The prototypes should be fully setup for the testing based on the required function, the equipment set up is as below:

- 1) One (1) Prototype Power Distribution Panel (PDP), built up to support HHPSD & FHPSD doorways operation, with individual breakers for each doorway;
- 2) One (1) PSC built up to support two platforms; platform 1 will be used with HHPSD and platform 2 will be used with FHPSD;
- 3) One (1) set of complete HHPSD doorway, including LCP, DLCP, PSI, EED and FS;
- 4) One (1) set of complete FHPSD doorway, including LCP, DLCP, PSI, EED and FS;
- 5) One (1) Portable Test Unit (PTU)
- 6) Two (2) Signalling System Simulators, one will be used with HHPSD and the second will be used with FHPSD.

The expected equipment list is given below:

- 1) Insulation Tester (Megger)
- 2) Digital Multi-meter
- 3) Oscilloscope
- 4) Linear Encoder
- 5) Frequency Converter
- 6) Handheld Tachometer
- 7) Force Gauge with handle
- 8) Sound Level Meter
- 9) Obstacle Plate (10 mm x 40 mm x 200 mm)
- 10) Vernier Calliper
- 11) Measuring Tape

The test equipment used for the testing will be lab-compliance and calibrated. The calibration certifications will be provided.

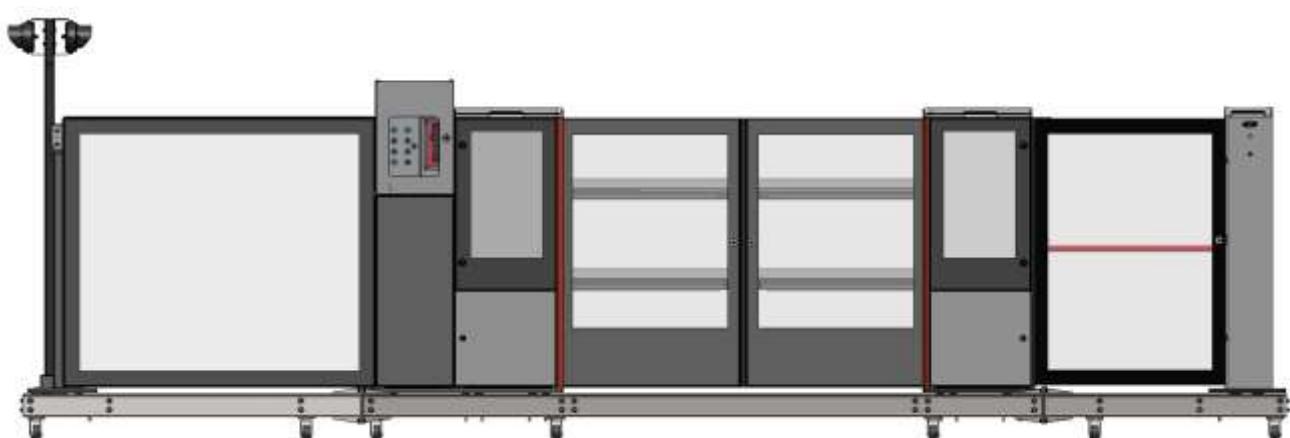


Figure 1 : HHPSD Prototype Setup

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Figure 2 : FHPSD Prototype Setup (Front View)



Figure 3 : FHPSD Prototype Setup (Back View)

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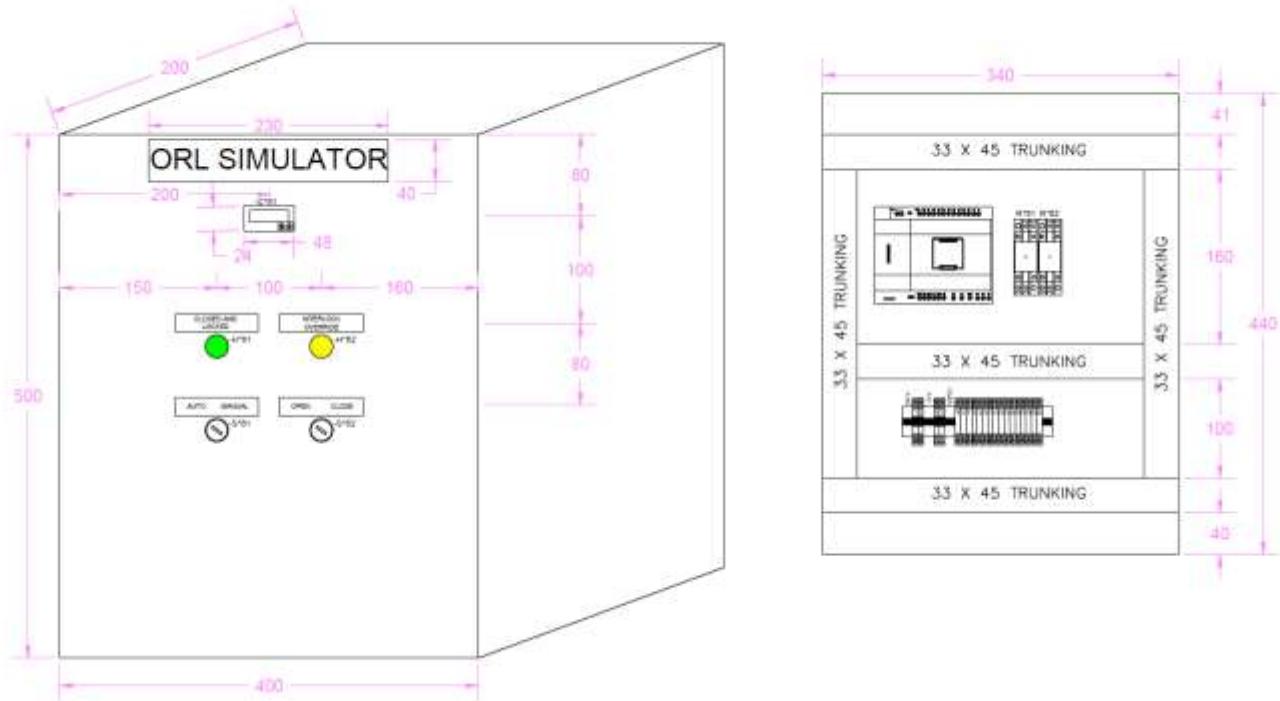


Figure 4 : Signalling Interface Simulator drawing

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The Signalling Interface Simulator consists of the components listed in Table 7 : Signalling Interface Simulator components.

The same system will be used for internal check at site before the actual interface test.

SIGNALLING INTERFACE SIMULATOR COMPONENTS	
Indicators	
Type	Function
Green lamp	To show Closed & Locked signal
Yellow lamp	To show Interlock Override signal

Selector switch	
Type	Function
2 position, 2NO	To select Auto or Manual simulator operation
	AUTO: alternates between Open and Close signals, automatically, on a pre-defined period of time
	MANUAL: the Open and Close signals are triggered manually, using the simulator OPEN-CLOSE selector S*62
2 position, 2NO	To select Open or Close the doors, when operating in Manual mode
	OPEN: when operating in Manual mode, the Open position simulates the Signaling Open command
	CLOSE: when operating in Manual mode, the Close position simulates the Signaling Close command.
Counter	
Type	Function
N/A	To count each Closed & Locked signal received by Signalling Interface Simulator

Relays	
Type	Function
Programmable	To simulate the Signalling Interface
Latching	To send the signals from Signalling Interface Simulator to the PSC

Table 7 : Signalling Interface Simulator components

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2.2 HHPSD Test Method and Requirements

2.2.1 HHPSD Physical Check

2.2.1.1 HHPSD Visual Inspection and Dimensional Check

Test No: ST-1000

Test Title: HHPSD Visual Inspection and Dimension Check

Objective: To demonstrate that PSD is implemented according to physical requirement.

Requirement:

- 1) Physical Check
- 2) Label Check
- 3) Dimension Check

Refer to Annex A-3.

Test Equipment: Measuring Tape

Estimated Test Duration: 60 minutes

Pre-condition of Test: The prototype set up is complete.

Test Setup: HHPSD prototype set-up.

Test Steps: Refer to Annex A-3.

2.2.2 HHPSD Electrical Check

2.2.2.1 HHPSD Insulation/Bonding Test on Prototype

Test No: ST-1010

Test Title: HHPSD Insulation/Bonding Test on Prototype

Objective: To demonstrate the PSD design meets the insulation requirement and bonding requirement.

Requirement:

- 1) Insulation Test: > 5 kΩ per platform when test under 500 VDC
- 2) Continuity Test: <1 Ω

Test Equipment: Insulation Tester (Megger)

Estimated Test Duration: 20 minutes

Pre-condition of Test: The prototype set up is complete; the bonding cable is connected; PSD system is powered off.

If any additional cable is required to use to extend the lead for the continuity test, the resistance should be taken from this cable and deduct off after the test (short the two end of the resistance tester to get the zero resistance value).

Safety Precaution:

- 1) Do not turn on the megger, while not in testing.
- 2) Ensure that no one is in contact with the PSD while the test is being conducted.

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Test Setup:

Refer to the following figure on the point of measurement and setup.

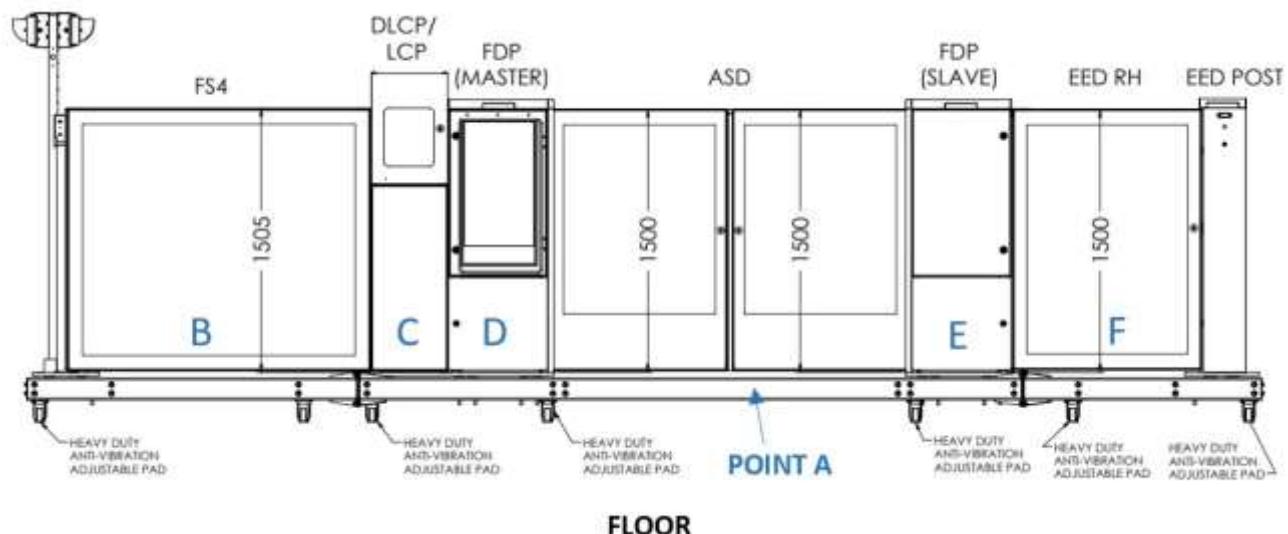


Figure 5 : HHPSD insulation/bonding test points.

Test Steps:

- 1) Insulation Test Point: Refer to Annex A-4.
- 2) Continuity Test Point: Refer to Annex A-4.

2.2.3 HHPSD Functional Test

2.2.3.1 HHPSD PSC Functional Test

Test No: ST-1110

Test Title: HHPSD PSC Functional Test

Objective: To demonstrate the PSC is designed based on the functional requirement.

Requirement: Refer to Annex A-5.

Test Equipment: Shorting cables, Digital Multi-meter

Estimated Test Duration: 30 minutes

Pre-condition of Test: Auto-Manual selector switch on Signalling System Simulator in Manual position and the Closed and Locked lamp illuminated.

Test Setup:

HHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex A-5.

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2.2.3.2 HHPSD Door Operation Mode Test

Test No: ST- 1120

Test Title: HHPSD Door Operation Mode Test

Objective: To demonstrate the door operation is design as per requirement for manual operation

Requirement: Refer to Annex A-6.

Test Equipment: Digital Multi-meter

Estimated Test Duration: 30 minutes

Pre-condition of Test: Auto-Manual selector switch on Signalling System Simulator in Manual position and the Closed and Locked lamp illuminated.

Test Setup: HHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex A-6

2.2.3.3 HHPSD Door Motion Profile

Test No: ST-1130

Test Title: HHPSD Door Motion Profile

Objective: To demonstrate the door motion is as per requirement.

Requirement:

- 1) Closing force < 140N
- 2) Time from unlatching to fully opened < 3 seconds
- 3) Time from closing to fully closed and locked < 3.5 seconds
- 4) Speed should not exceed 0.5 m/s during door opening/closing.

Test Equipment:

Oscilloscope, Handheld Tachometer, Linear Encoder, Frequency Converter, Force Gauge with handle

Estimated Test Duration: 60 minutes

Pre-condition of Test: Auto-Manual selector switch on Signalling System Simulator in Manual position and the Closed and Locked lamp illuminated.

Test Setup: HHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex A-7.

The Force Gauge with handle will be placed on the nosing rubber of the doorway to measure the force.

For the door motion profile, it will be captured by the oscilloscope through the frequency converter. As the door is connected to the Linear Encoder, the movement of the doorway will generate pulses to the frequency current converter. The voltage level at the frequency converter will be display on the oscilloscope.

The handheld tachometer will be placed against ASD Gap Filler to measure the speed.

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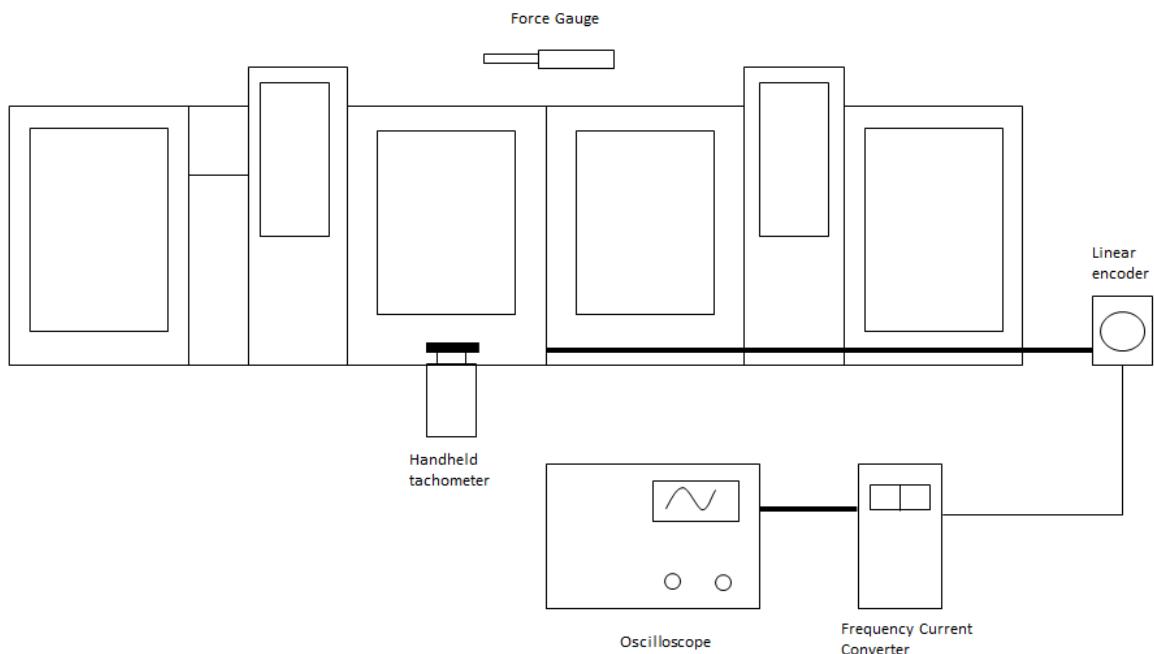


Figure 6 : Door Motion Profile Setup for HHPSD

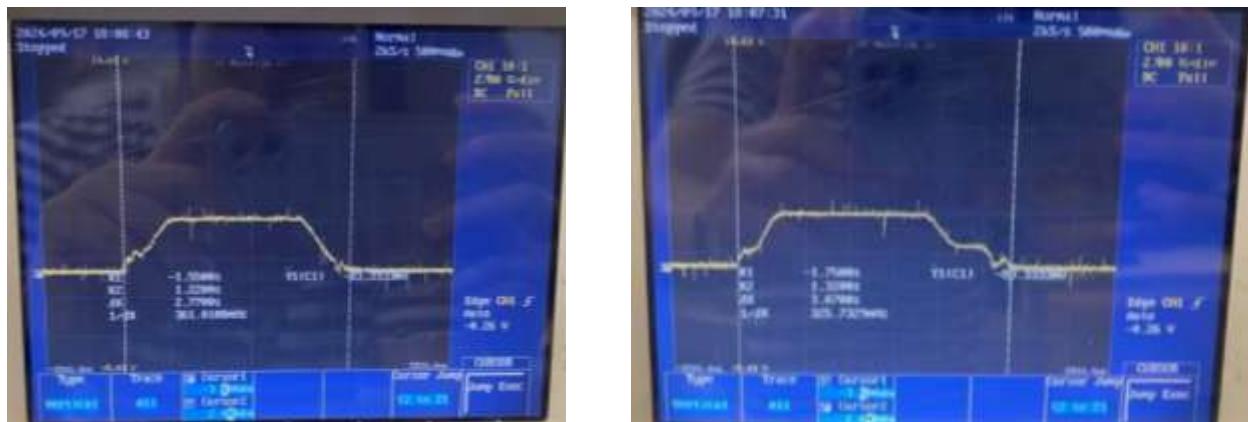


Figure 7 : Door Opening Profile (Left) and Door Closing Profile (Right) from Oscilloscope

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2.2.3.4 HHPSD Obstacle Detection

Test No: ST-1140

Test Title: HHPSD Obstacle Detection

Objective: To demonstrate the obstacle detection is as per requirement.

Requirement:

- 1) Able to detect obstacle with a minimum gap of 10 mm
- 2) Adjustable reopen distance 30 cm to full length, (nominal 50 cm)
- 3) Obstacle detection cycle 1 to 20 cycles. The nominal is 3 cycles.

Test Equipment: Obstacle Plate (10 mm x 40 mm x 200 mm), Measuring Tape

Estimated Test Duration: 15 minutes

Pre-condition of Test: Auto-Manual selector switch on Signalling System Simulator in manual position and the Closed and Locked lamp illuminated. Ensure that the obstacle detection is set to nominal setting.

Test Setup: HHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP

Test Steps: Refer to Annex A-8.

2.2.3.5 HHPSD Portable Test Unit

Test No: ST-1210

Test Title: HHPSD Portable Test Unit

Objective: To demonstrate the Portable Test Unit is as per requirement.

Requirement: Refer to Annex A-9.

Test Equipment: PTU

Estimated Test Duration: 15 minutes

Pre-condition of Test: The prototype set up is complete.

Test Setup: HHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex A-9.

2.2.3.6 HHPSD Acoustic Test

Test No: ST-1310

Test Title: HHPSD Acoustic Test

Objective: To demonstrate the operation of the PSD is within the requirement.

Requirement: 73 dBA at 1.5m height and 1m distance from central of the sliding door.

Test Equipment: Sound Level Meter

Estimated Test Duration: 10 minutes

Pre-condition of Test:

The test setup is powered up and in normal operation mode. All the FDP covers are closed and locked. Ensure that ambient level is 15dBA below the requirement.

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Test Setup: HHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP. Set up the Sound Level meter on a stand, set at a distance of 1m from the PSD screen and 1.5m above FFL.

Test Steps: Refer to Annex A-10.

2.2.3.7 HHPSD ERM Manual Release Mechanism Test

Test No: ST-1410

Test Title: ERM Manual Release Mechanism Test

Objective: To demonstrate the operation of the ERM is within the requirement.

Requirement: ERM unlocking force to be \leq 67 N;

Door opening force after ERM unlocking force to be \leq 133N

Test Equipment: Digital Force Gauge

Estimated Test Duration: 10 minutes

Pre-condition of Test: The prototype set up is complete.

Test Setup: HHPSD prototype, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex A-11.

2.2.3.8 HHPSD EED Test

Test No: ST-1510

Test Title: HHPSD EED Test

Objective: To demonstrate the operation of Panic Bar is within the requirement and EED bypass key switch is functional.

Requirement: Panic Bar unlocking force to be \leq 67 N;

Door opening force after Panic Bar is unlocked to be \leq 133N

Test equipment: Digital Force Gauge

Estimated Test Duration: 10 minutes

Pre-condition of Test: The prototype set up is complete.

Test Setup: HHPSD prototype, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex A-12.

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2.2.4 HHPSD Accelerated Life Cycle Inspection

Test No: ST-2000

Test Title: HHPSD Accelerated Life Cycle Inspection

Objective: To check the system capability to operate for more than one million cycles.

Requirement: The system is able to complete 1 million cycles of continuous open and close operation [ORL_7475]. The timing set per cycle is as follow:
(Opening: 6 s; Closing: 6s)

To monitor continuous testing in Singapore effectively, surveillance CCTV for remote monitoring is required. CCTV camera(s) shall be placed to capture relevant areas and ensure they have good coverage of the testing activities.

Pre-condition of Test: The functional test was complete, all the tension, alignment, lubrication were performed.

Test Procedure:

The door counter is reset to zero upon the commencement of 1 Million Cycles, at the beginning all the check is conducted, follow by 250,000 cycles, 500,000 cycles, 750,000 cycles and 1,000,000 cycles. During the stoppage, the check is conducted and preventive maintenance will also be conducted before the system continue to operated, like belt tension adjustment, lubrication, and others activities are performed when necessary, during the preventive maintenance check.

Estimated Time:

One cyclic time = 12 s

Thus, per day cycle = 7200 cycles.

Duration for 1 million ≈ 138.8 days ≈ 4.6 months

S/N	Component	Check Points
1	Drive Unit and Mechanism	
i	Motor tooth belt	Check for cracks, frayed spots, cuts or unusual wear patterns
ii	Belt tension	Visual check on adjuster bolt to be flush with tensioner bracket Adjust the belt tension by turning the adjuster bolt until it is flush with the tensioner bracket, if necessary
iii	Top guide rail	No significant wear on top guide rail. Not more than 1mm
2	Locking Mechanism	
i	Locking latch	No significant wear on locking latch. Not more than 1mm
ii	Locking pin	No significant wear on locking pin. Not more than 1mm
iii	Fastener	No movement after the test

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S/N	Component	Check Points
3	<u>Door Leaves</u>	
i	Top nylon glider	No significant wear on top nylon glider. Not more than 1mm
4	<u>Door Opening</u>	
i	Clear opening width between claddings	Clear opening width between claddings is maintained at $2000 \pm 3\text{mm}$

Table 8 : HHPSD Accelerated Life Cycle Inspection Checks

Refer to Annex B-2, Annex B-3 , Annex B-4, Annex B-5 and Annex B-6 for starting and each stoppage checking.

Refer to Annex B-7 for the Event Log which should be recorded for any stoppage of the doorway due to planned or unforeseen circumstances.

2.2.5 HHPSD Maintenance Demonstration

Test No: ST-3000

Test Title: HHPSD Maintenance Demonstration

Objective: To physically demonstrate the replacement of the following tasks within the specified time frame.
[ORL_7523633]

Requirement:

- Complete maintenance task within specify time

Refer to Annex H

Estimated Test Duration: 300 minutes

S/N	Task Component	No. of Personnel	Time (mins)
1	DCU replacement	01	<30
2	Belt Replacement	01	<30
3	Motor Replacement (Master)	02	<30
4	ASD Locking Block Replacement	02	<30
5	ASD Glass Replacement	02	<30
6	ERM Release Housing Replacement	02	<30
7	PLC Replacement	01	<30
8	One Switch Replacement at DLCP	01	<30

Table 9 : Maintenance Demonstration List

Replacement of other components shall be carried out in accordance with the O&M maintenance documentation.

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2.3 FHPSD Test Method and Requirements

2.3.1 FHPSD Physical Check

2.3.1.1 FHPSD Visual Inspection and Dimensional Check

Test No: ST-5000

Test Title: FHPSD Visual Inspection and Dimensional Check

Objective: To demonstrate that PSD is implemented according to physical requirement.

Requirement:

- 1) Physical Check
- 2) Label Check
- 3) Dimension Check

Refer to Annex C-3.

Test Equipment: Measuring Tape

Estimated Test Duration: 60 minutes

Pre-condition of Test: The prototype set up is complete

Test Setup: FHPSD prototype set-up

Test Steps: Refer to Annex C-3.

2.3.2 FHPSD Electrical Check

2.3.2.1 FHPSD Insulation/Bonding Test on Prototype

Test No: ST-5010

Test Title: FHPSD Insulation/Bonding Test on Prototype

Objective: To demonstrate the PSD design meets the insulation requirement and bonding requirement.

Requirement:

- 1) Insulation Test: > 5 kΩ per platform when test under 500 VDC
- 2) Continuity Test: <1 Ω

Test Equipment: Insulation Tester (Megger)

Estimated Test Duration: 20 minutes

Pre-condition of Test: The prototype set up is complete; the bonding cable is connected; PSD system is powered off.

If any additional cable is required to use to extend the lead for the continuity test, the resistance should be taken from this cable and deduct off after the test (short the two end of the resistance tester to get the zero resistance value).

Safety Precaution:

- 1) Do not turn on the megger, while not in testing.
- 2) Ensure that no one is in contact with the PSD while the test is being conducted.

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Test Setup:

Refer to Figure 8 for the insulation test points and Figure 9 for bonding test points.

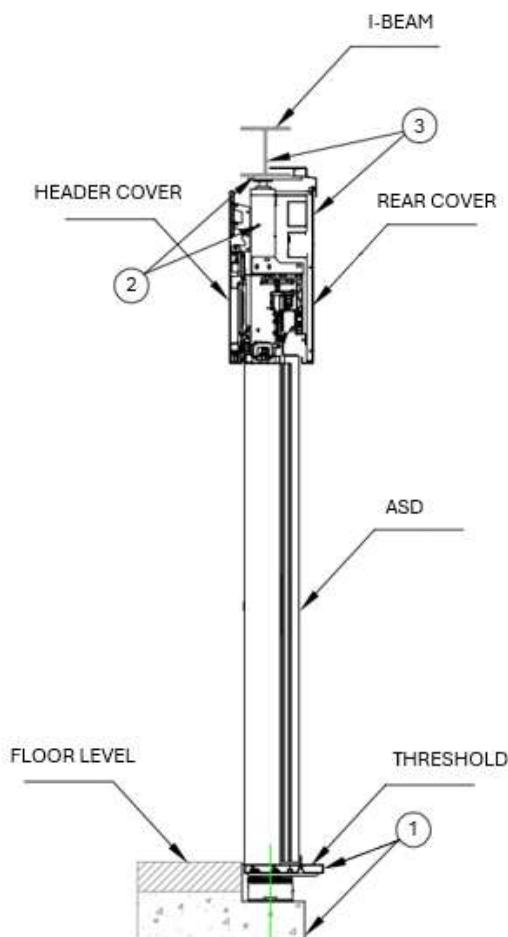


Figure 8 : FHPSD insulation test points

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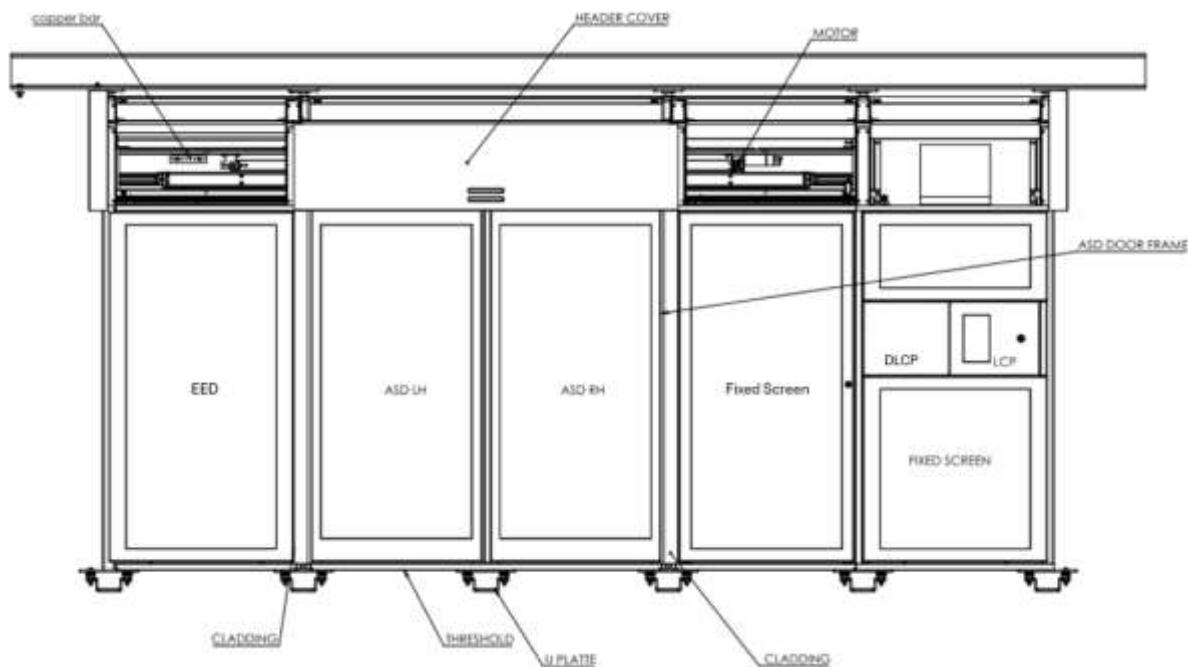


Figure 9 : FHPSD bonding test points

Test Steps:

- 1) Insulation Test Point: Refer to Annex C-4.
- 2) Continuity Test Point: Refer to Annex C-4.

2.3.3 FHPSD Functional Test

2.3.3.1 FHPSD PSC Functional Test

Test No: ST-5110

Test Title: FHPSD PSC Functional Test

Objective: To demonstrate the PSC is designed based on the functional requirement

Requirement: Refer to Annex C-5.

Test Equipment: Shorting cables, Digital Multi-meter

Estimated Test Duration: 30 minutes

Pre-condition of Test: Signalling System Simulator, Auto-Manual selector switch in manual position and the Closed and Locked lamp illuminated.

Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex C-5.

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2.3.3.2 FHPSD Door Operation Mode Test

Test No: ST5120

Test Title: FHPSD Door Operation Mode Test

Objective: To demonstrate the door operation is designed as per requirement for manual operation

Requirement: Refer to Annex C-6

Test equipment: Digital Multi-meter

Estimated Test Duration: 30 minutes

Pre-condition of Test: Signalling System Simulator Auto/Manual switch in manual position and the Closed and Locked lamp illuminated.

Test Setup: FHPSD Prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP

Test Steps: Refer to Annex C-6.

2.3.3.3 FHPSD Door Motion Profile

Test No: ST-5130

Test Title: FHPSD Door Motion Profile

Objective: To demonstrate the door motion is as per requirement.

Requirement:

- 1) Closing force < 140N
- 2) Time from unlatching to fully opened < 3 seconds
- 3) Time from closing to fully closed and locked < 3.5 seconds
- 4) Speed should not exceed 0.5 m/s during door opening/closing

Test Equipment:

Oscilloscope, Handheld Tachometer, Linear Encoder, Frequency Converter, Force Gauge

Estimated Test Duration: 60 minutes

Pre-condition of Test: Signalling System Simulator Auto/Manual switch in manual position and the Closed and Locked lamp illuminated.

Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps:

Refer to Annex C-7.

The Force Gauge will be placed on the nosing rubber of the doorway to measure the force.

For the door motion profile, it will be captured by the waveform on the oscilloscope. As the door is connected to the Linear Encoder, the movement of the doorway will generate pulses to the frequency converter. The voltage level at the frequency converter will be displayed on the oscilloscope.

The handheld tachometer will be placed against ASD Gap Filler to measure the speed.

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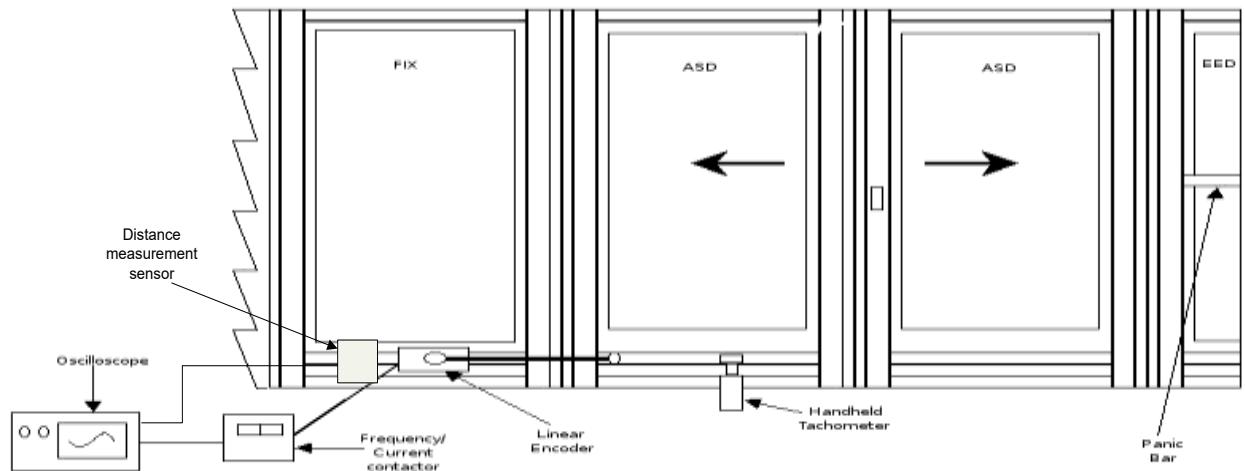


Figure 10 : Door Motion Profile Set up for FHPSD

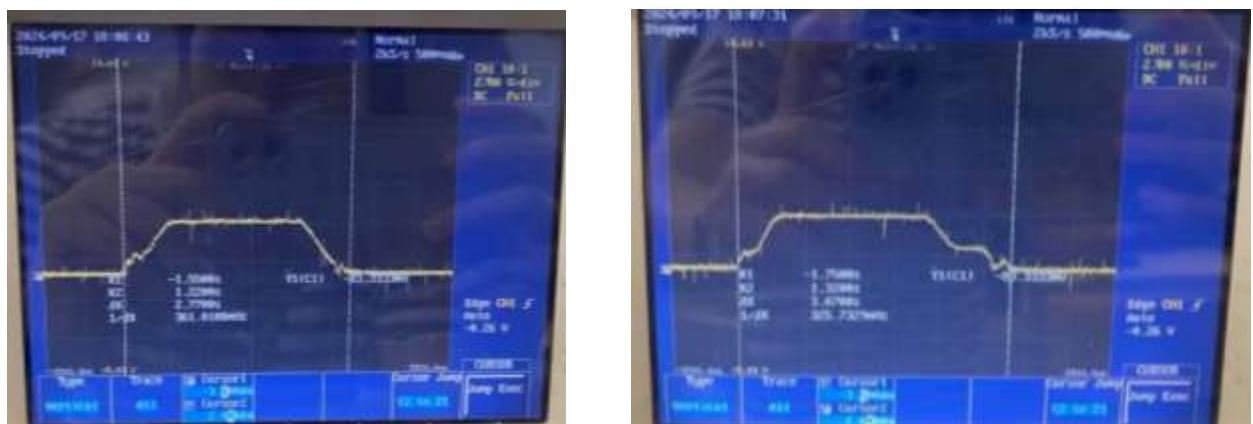


Figure 11 : Door Opening Profile (Left) and Door Closing Profile (Right) from Oscilloscope

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2.3.3.4 FHPSD Obstacle Detection

Test No: ST-5140

Test Title: FHPSD Obstacle Detection

Objective: To demonstrate the obstacle detection is as per requirement.

Requirement:

- 1) Able to detect obstacle with a minimum gap of 10 mm
- 2) Adjustable reopen distance 30 cm to full length, (nominal 50 cm)
- 3) Obstacle detection cycle 1 to 20 cycles. The nominal is 3 cycles.

Test Equipment: Obstacle Plate (10 mm x 40 mm x 200 mm), Measuring Tape

Estimated Test Duration: 15 minutes

Pre-condition of Test: Signalling System Simulator Auto/Manual switch in manual position and the Closed and Locked lamp illuminated. Ensure that the obstacle detection is set to nominal setting.

Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP

Test Steps: Refer to Annex C-8.

2.3.3.5 FHPSD Portable Test Unit

Test No: ST-5210

Test Title: FHPSD Portable Test Unit

Objective: To demonstrate the Portable Test Unit is as per requirement.

Requirement: Refer to Annex C-9.

Test Equipment: PTU

Estimated Test Duration: 15 minutes

Pre-condition of Test: The prototype set up is complete

Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP

Test Steps: Refer to Annex C-9.

2.3.3.6 FHPSD Acoustic Test

Test No: ST-5310

Test Title: FHPSD Acoustic Test

Objective: To demonstrate the operation of the PSD is within the requirement.

Requirement: 73 dBA at 1.5m height and 1m distance from central of the sliding door.

Test Equipment: Sound Level Meter

Estimated Test Duration: 10 minutes

Pre-condition of Test:

The test setup is powered up and in normal operation mode. All the header covers are closed and locked. Ensure that ambient level is 15dBA below the requirement.

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Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP. Set up the Sound Level meter on a stand, set at a distance of 1m from the PSD screen and 1.5m above FFL.

Test Steps: Refer to Annex C-10.

2.3.3.7 FHPSD ERM Manual Release Mechanism Test

Test No: ST-5410

Test Title: FHPSD ERM Manual Release Mechanism Test

Objective: To demonstrate the operation of the ERM is within the requirement.

Requirement: ERM unlocking force to be \leq 67 N;

Door opening force after ERM unlocking force to be \leq 133N

Test Equipment: Digital Force Gauge

Estimated Test Duration: 10 minutes

Pre-condition of Test: The prototype set up is complete.

Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex C-11.

2.3.3.8 FHPSD EED Test

Test No: ST-5510

Test Title: FHPSD EED Test

Objective: To demonstrate the Panic Bar is within the requirement and EED bypass key switch is functional..

Requirement: Panic Bar unlocking force to be \leq 67 N;

Door opening force after Panic Bar is unlocked to be \leq 133N

Test Equipment: Digital Force Gauge.

Estimated Test Duration: 10 minutes

Pre-condition of Test: The prototype set up is complete.

Test Setup: FHPSD prototype set-up, including Signalling System Simulator, PSC, DCU, LCP and DLCP.

Test Steps: Refer to Annex C-12.

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2.3.4 FHPSD Accelerated Life Cycle Inspection

Test No: ST-6000

Test Title: FHPSD Accelerated Life Cycle Inspection

Objective: To check the system capability to operate for more than one million cycles.

Requirement: The system is able to complete 1 million cycles of continuous open and close operation [ORL_7475]. The timing set per cycle is as follow:
(Opening: 6 s; Closing: 6s)

To monitor continuous testing in Singapore effectively, surveillance CCTV for remote monitoring is required. CCTV camera(s) shall be placed to capture relevant areas and ensure they have good coverage of the testing activities.

Pre-condition of Test: The functional test was complete, all the tension, alignment, lubrication were performed.

Test Procedure:

The door counter is reset to zero upon the commencement of 1 Million Cycles, at the beginning all the check is conducted, follow by 250,000 cycles, 500,000 cycles, 750,000 cycles and 1,000,000 cycles. During the stoppage, the check is conducted and preventive maintenance will also be conducted before the system continue to operate, like belt tension adjustment, lubrication, and others activities are performed when necessary, during the preventive maintenance check.

Estimated Time:

One cyclic time = 12 s

Thus, per day cycle = 7200 cycles

Duration for 1 million ≈ 138.8 days ≈ 4.6 months

S/N	Component	Check Points
1	Drive Unit and Mechanism	
i	Motor tooth belt	Check for cracks, frayed spots, cuts or unusual wear patterns
ii	Belt tension	Visual check on adjuster bolt to be flush with tensioner bracket Adjust the belt tension by turning the adjuster bolt until it is flush with the tensioner bracket, if necessary
2	Locking Mechanism	
a	Locking latch	No significant wear on locking latch. Not more than 1mm
b	Locking pin	No significant wear on locking pin. Not more than 1mm
c	Fasteners	No movement after the test
3	Door Leaves	
i	Bottom nylon guide	No significant wear on bottom nylon guide. Not more than 1mm

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S/N	Component	Check Points
4	<u>Door Opening</u>	
i	Clear opening	Clear opening width between claddings is maintained at $2000 \pm 3\text{mm}$

Table 10 : FHPSD Accelerated Life Cycle Inspection Checks

Refer to Annex D-2, Annex D-3, Annex D-4, Annex D-5 and Annex D-6, for starting and each stoppage checking.

Refer to Annex D-7 for the Event Log which should be recorded for any stoppage of the doorway due to planned or unforeseen circumstances.

2.3.5 FHPSD Maintenance Demonstration

Test No: ST-7000

Test Title: FHPSD Maintenance Demonstration

Objective: To physically demonstrate the replacement of the following tasks within the specified time frame.
[ORL_7253]

Requirement:

- Complete maintenance task within the specified time.

Refer to Annex I

Estimated Test Duration: 240 minutes

S/N	Task Component	No. of Personnel	Time (mins)
1	DCU replacement	01	<30
2	Belt Replacement	01	<30
3	Motor Replacement	02	<30
4	ASD Locking Block Replacement	02	<30
5	ASD Glass Replacement	02	<30
6	ERM Release Housing Replacement	02	<30
7	PLC Replacement	01	<30
8	One Switch Replacement at DLCP	01	<30

Table 11 : Maintenance Demonstration List

Replacement of other components shall be carried out in accordance with the O&M maintenance documentation.

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2.4 Test Location

ST Engineering Urban Solutions Ltd.
24 Ang Mo Kio Street 65
Block D Level 1
High Bay Area
Singapore 569061

2.5 Test Parameters

Refer to individual test case.

2.6 Test Constraints

NIL.

2.7 Pass Fail Criteria

Refer to schematic diagram of process flow of test in Figure 12.

For test results which do not meet the requirements, an investigation will be conducted to analyse the cause(s) of the failure(s).

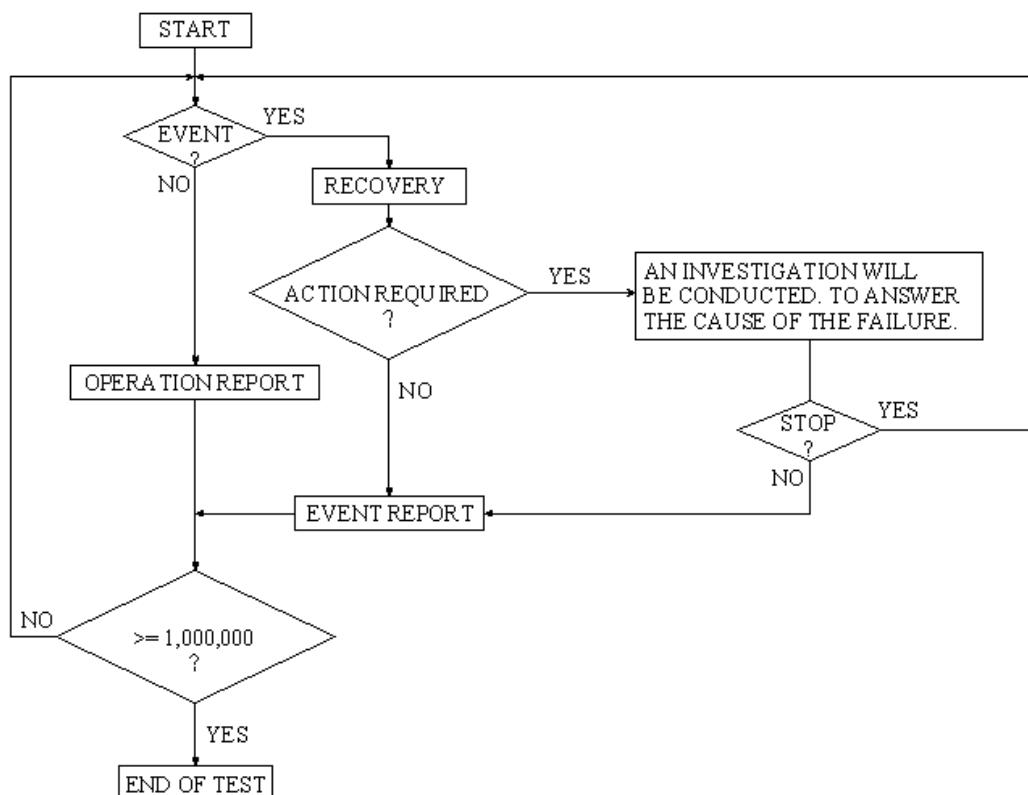


Figure 12 : Schematic Diagram of process flow of test

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2.8 Test Equipment and Personnel

2.8.1 Test Equipment

Please refer to the individual test case.

2.8.2 Test Personnel

Role	Responsibilities
System Manager (Mechanical)	<ol style="list-style-type: none">1) Responsible for the overall performance of the mechanical, façade and architectural aspects of the PSD system.2) Responsible for the progress of the various sub-groups, initiates corrective tasks, implements and enforces the safety and quality programme.3) Interface between the Engineering Manager and the Mechanical Design Team
Senior Engineer (Mechanical)	<ol style="list-style-type: none">1) Mechanical Function test for PSD system product validation2) Performs the verification activities of the project3) Verify proper traceability for the various phase of the project4) Verify the artefacts produced for a phase meets the requirements of the previous phase
System Manager (Electrical & Control)	<ol style="list-style-type: none">1) Responsible for the overall performances of the Electrical and Control aspects of the PSD System.2) Responsible for the progress of the various sub-groups, initiates corrective tasks, implements and enforces the safety and quality programme.3) Interface between the Electrical & Control Design Team and the Engineering Manager
T&C Manager (Validator & Verifier)	<ol style="list-style-type: none">1) Perform PSD system validation / reliability testing.2) Function test of mechanical and electrical for PSD system product validation3) Review test requirements with project team members.4) Handle T & C test plans generation and documentation5) Performs the verification activities of the project6) Verify proper traceability for the various phase of the project7) Verify the artefacts produced for a phase meets the requirements of the previous phase8) Verify the artefacts adhere adequately to the requirements in the SQAP, standards and guidelines
Test Engineer (Validator & Verifier)	<ol style="list-style-type: none">1) Perform PSD system validation / reliability testing.2) Function test of electrical for PSD system product validation3) Performs the verification activities of the project4) Verify proper traceability for the various phase of the project5) Verify the artefacts produced for a phase meets the requirements of the previous phase

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Role	Responsibilities
QC/QA Manager	<ul style="list-style-type: none"> 1) To manage and implement QA procedures for the project and systems development. 2) To take part in System and Software Safety reviews, analyses and assessment. 3) Conduct internal audit for the product / project
BEM / CK	<ul style="list-style-type: none"> 1) To verify the PSD system as per requirement
MRTA	<ul style="list-style-type: none"> 1) To witness the prototype functional test

Table 12 : Table of Personnel / Skill requirements

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle Submission no.: PSD-40002.B Uncontrolled if printed out or copied	36 of 134
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3 Annexes

List of Annexes are listed in table below.

S/N	Annex	Description
1	A	HPSD System Test Record
2	B	HPSD Accelerated Life Cycle Test Record
3	C	FPSD System Test Record
4	D	FPSD Accelerated Life Cycle Test Record
5	E	Punch List
6	F	Attendance List

Table 13 : List of Annexes

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Annex A – HPSD Function Test Record

A-1 Test Commencement

Test Identifier	Location	Date	Time	Lead Test Engineer Name	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-1000	Singapore						
ST-1010	Singapore						
ST-1110	Singapore						
ST-1120	Singapore						
ST-1130	Singapore						
ST-1140	Singapore						
ST-1210	Singapore						
ST-1310	Singapore						
ST-1410	Singapore						
ST-1510	Singapore						

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A-2 Test Equipment Check

Test Equipment	Model/Serial No. (if any)	Calibration Expiry Date
1) Insulation Tester (Megger)		
2) Digital Multi-meter		
3) Oscilloscope		
4) Linear Encoder	N/A	N/A
5) Frequency Converter	N/A	N/A
6) Handheld Tachometer		
7) Digital Force Gauge		
8) Sound Level Meter		
9) Obstacle Plate (10 mm x 40 mm x 200 mm)	N/A	N/A
10) Vernier Calliper		
11) Measuring Tape	N/A	N/A

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A-3 HHPSD Visual Inspection and Dimension Check

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurements	Result (Pass/Fail)
ST-1000	1 TS ID:-	Physical Check (based on the drawing)	No visible dent, scratches.		
			Check the PSC/LCP is clean and is free of scrap wire and debris.		
			Check panel, covers and doors fit correctly and securely.		
			Check all cables are properly supported and tied.		
			Ensure all connections are terminated correctly into terminal blocks.		
			No abrupt irregularities or sharp edges are present		
2 TS ID:-	Label Check	Label Check	Proper Label on the PSC		
			Proper Label on the LCP		
			Proper Label on the DLCP		
			Proper Label on the DCU		
3 TS ID:-	Dimension Check	Dimension Check	PSC Cabinet Dimension Height (Without Plinth): 1800 ± 5 mm Width: 1000 ± 5 mm Depth: 400 ± 2 mm Plinth: $200mm\pm2$ mm		
			ASD Frame Dimension (w/o nosing rubber) Height: 1490 ± 5 mm Width: 1035 ± 5 mm Depth: 53.5 ± 2 mm		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurements	Result (Pass/Fail)
			EED Frame Dimension Height:1485±5mm Width:1072.5±5mm Depth:49.5±2mm		
	4 TS ID:-	Dimension Check	FS-II Sub-Frame Dimension Height:1058±5mm Width:432±5mm Depth:14.5±2mm		
			FS-IV Sub-Frame Dimension Height:1495±5mm Width:1725±5mm Depth:75±2mm		
			FDP Sub-Frame Dimension Height:954±5mm Width:563±5mm Depth:15±2mm		
			LCD Enclosure Clear Opening Height: 887±5mm Clear Opening Width: 460±5mm Depth : 142.5±2mm		
			Rear Cover Height:304±5mm Width:1602±5mm Depth:102±5mm		
			Gap Filler Width:962.5±5mm Depth:165±5mm		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurements	Result (Pass/Fail)
5 TS ID:-		Coating Thickness	FS-II Sub-Frame MIN. Thickness 60µm		
			FS-IV Sub-Frame MIN. Thickness 60µm		
			FDP Sub-Frame MIN. Thickness 60µm		
			LCD Enclosure MIN. Thickness 60µm		
			Rear Cover MIN. Thickness 60µm		

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A-4 HHPSD Insulation/Bonding Test on Prototype

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
ST-1010	1 TS ID: [ORL_7541]	Insulation Test Point The test point 1 is between the Point A (floor bar) and Point B (FS metal parts).	> 5 kΩ per platform when test under 500VDC		
		Insulation Test Point The test point 2 is between the Point A (floor bar) and Point C (LCP keyhole)	> 5 kΩ per platform when test under 500VDC		
		Insulation Test Point The test set 3 is between the Point A (floor bar) and Point D (Master FDP Subframe keyhole)	> 5 kΩ per platform when test under 500Vdc		
		Insulation Test Point The test point 4 is between the Point A (floor bar) and Point E (Slave FDP Subframe keyhole) .	> 5 kΩ per platform when test under 500VDC		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
		Insulation Test Point The test point 5 is between the Point A (floor bar) and Point F (EED Keyhole).	> 5 kΩ per platform when test under 500VDC		
	2 TS ID: [ORL_7540]	Continuity Test Point The test point 1 is between the Point B and Point C.	<1Ω		
		Continuity Test Point The test point 2 is between the Point C and Point D.	<1Ω		
		Continuity Test Point The test point 3 is between the Point D and Point E.	<1Ω		
		Continuity Test Point The test point 4 is between the Point E and Point F.	<1Ω		
		Continuity Test Point The test point 5 is between the ASD and point D.	<1Ω		

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A-5 HHPSD PSC Functional Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurements	Result (Pass/Fail)
ST-1110	1 TS ID: [ORL_7490]	On Signalling Interface Simulator: 1. Turn the Auto/Manual switch S*61 in Manual position; 2. Turn the Open/Close switch S*62 in Open position;	1. Doors Closed and Locked lamp is extinguished (at Signalling Interface Simulator) 2. The Doors Open lamp (DOI) should be illuminated. 3.HMI Door Overview Page will show 'ASD Opened' when ASD is in fully open position.		
	2 TS ID: [ORL_7492]	On Signalling Interface Simulator: 1. Keep the Auto/Manual switch S*61 in Manual position; 2. Turn the Open/Close switch S*62 in Close position	1. The Doors Open lamp (DOI) should be blinking and extinguished when ASD is fully closed and locked. 2. HMI Door Overview Page will show 'ASD Closed' when ASD is in closed and locked position.		
	3 TS ID: [ORL_7494]	When the door is fully closed and locked	1. Doors Closed and Locked lamp is illuminated on Signalling Interface Simulator 2. The Doors Open lamp (DOI) is extinguished. 3. HMI Door Overview Page will show 'ASD Closed' when ASD is in closed and locked position.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurements	Result (Pass/Fail)
	4 TS ID: [ORL_7494] [ORL_7532] [ORL_7533]	Check Door Closed and Locked loop when the door is fully closed: press any one of the limit switches using screwdriver	1. PSI is extinguished. 2. The Closed and Locked lamp is extinguished at Signalling Interface Simulator		
	5 TS ID: [ORL_7494] [ORL_7532] [ORL_7533]	Release the limit switch	1. PSI is illuminated. 2. The Closed and Locked lamp is illuminated at Signalling Interface Simulator		
	6 TS ID: [ORL_7551]	On Signalling Interface Simulator: 1. Keep the Auto/Manual switch S*61 in Manual position; 2. Turn the Open/Close switch S*62 in Close position 3. While the door is closing, turn off DCU	The door will stop in its current position and door not slam		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurements	Result (Pass/Fail)
	7 TS ID: [ORL_7551]	<p>On Signalling Interface Simulator:</p> <ol style="list-style-type: none"> 1. Keep the Auto/Manual switch S*61 in Manual position; 2. Turn the Open/Close switch S*62 in Open position 3. While the door is opening, turn off DCU 	The door will stop in its current position and door not slam		

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A-6 HHPSD Door Operation Mode Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurements	Result (Pass/Fail)
ST-1120	1 TS ID: [ORL_7517] [ORL_7569]	At LCP, turn the Auto/Close/Manual Enable key switch to Close position. At Signalling Interface Simulator, turn the Open-Close switch S*62 to Open position.	The door should not open and the Green PSI shall remain illuminated.		
2 TS ID: [ORL_7569]		At LCP, turn the Auto/Close/Manual Enable key switch to Manual Enable position. At LCP, press the Open button.	The ASD should open.		
			The DOI shall be blinking when the ASD is opening and remains illuminated when fully opened.		
			The Green PSI shall not be illuminated.		
3 TS ID: [ORL_7569]		At LCP, turn the Auto/Close/Manual Enable key switch to Close Position.	The ASD should close.		
			The DOI shall be blinking when the ASD is closing and shall not be illuminated when in the closed and locked position.		
			The Green PSI shall be illuminated when the ASD is in closed and locked.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurements	Result (Pass/Fail)
	4 TS ID: [ORL_7495]	At LCP, turn the Auto/Close/Manual Enable key switch to Auto position. At LCP, turn the Interlock Override switch to ON position.	'Interlock Override' is not shown on HMI. PSI is not illuminated.		
	5 TS ID: [ORL_7495] [ORL_7535]	At LCP, turn the Auto/Close/Manual Enable key switch to Close position. At LCP, turn the Interlock Override switch to ON position.	'Interlock Override' is shown on HMI. PSI is illuminated in Green and blinking		
	6 TS ID: [ORL_7536]	At LCP, turn the Interlock Override switch to OFF position.	'Interlock Override' is not shown on HMI. PSI is not illuminated.		
	7 TS ID: [ORL_7495]	At LCP, turn the Auto/Close/Manual Enable key switch to Manual Enable position. At LCP, turn the Interlock Override switch to ON position.	'Interlock Override' is not shown on HMI. PSI is not illuminated.		
	8 TS ID: [ORL_7518] [ORL_7569]	At DLCP, turn the Auto/Close/Manual Enable key switch to Manual Enable position. At DLCP, press the Open button.	The ASD should open.		
			The DOI shall be blinking when the ASD is opening and remains illuminated when fully opened.		
			The Green PSI shall not be illuminated.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurements	Result (Pass/Fail)
	9 TS ID: [ORL_7569]	At DLCP, turn the Auto/Close/Manual Enable key switch to Close Position.	The ASD should close.		
			The DOI shall be blinking when the ASD is closing and shall not be illuminated when in the closed and locked position.		
			The Green PSI and All Door Closed and Lock Indicator on DLCP/LCP shall be illuminated when the ASD is in closed and locked.		
	10 TS ID: [ORL_7574]	Turn LCKS to Manual Position on the LCB Make sure ASD is open. Press the Close push button.	The DOI shall be blinking when the ASD is closing and shall be extinguished when in the closed and locked position.		
	11 TS ID: [ORL_7580] [ORL_7592] [ORL_7593]	Turn LCKS to Isolation mode.	The DOS is lighted on with steady red light. The door will be mechanically locked (cannot be opened manually using ERM/ staff key). The LCKS key is removable.		

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A-7 HHPSD Door Motion Profile

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
ST-1130	1 TS ID: [ORL_7548]	At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Open position The door opening profile is shown on the oscilloscope waveform	Opening time measured from the oscilloscope is less than 3.0s		
	2 TS ID: [ORL_7548]	At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Close position. The door closing profile is shown on the oscilloscope waveform	Closing time measured from the oscilloscope is less than 3.5s		
	3 TS ID: [ORL_7548]	At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Open position The rate of distance travelled (speed) is measured by the handheld tachometer for the maximum opening speed and record the measured value.	The speed measured from the handheld tachometer should be less than 0.5 m/s		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
	4 TS ID: [ORL_7548]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Close position</p> <p>The rate of distance travelled (speed) is measured by the handheld tachometer for the maximum closing speed and record the measured value.</p>	The speed measured from the handheld tachometer should be less than 0.5m/s		
	5 TS ID: [ORL_7547]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Close position.</p> <p>Stop and hold the door using the force gauge.</p> <p>Record the closing force.</p>	The closing force should be less than 140N at any door leaf		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
	6 TS ID: [ORL_7547]	<p>Use the weight of sliding door and refer the values from step 1~4 to calculate the kinetic energy when sliding door is moving at open/close</p> <p>K.E.=$\frac{1}{2}mv^2$. The unit of K.E. is Joule, mass is Kg and speed is m/s.</p> <p>Weight of door is 60kg per leaf.</p>	<p>The maximum kinetic energy should be less than 9.5J.</p> <p>The kinetic energy of last 150mm trip during closing should be less than 2J.</p>		

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A-8 HHPSD Obstacle Detection

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
Obstacle at 0.3m above FFL					
ST-1140	1 TS ID: [ORL_7530] [ORL_7550] [ORL_7551] [ORL_7576]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>When the door achieve the fully opened position, turn the Open-Close switch to Close position.</p> <p>During the closing process, place the obstacle plate at 0.3m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by 500mm ± 20mm (adjustable) upon detecting the obstruction.</p> <p>The ASD will delay for 2 second at reopen distance of 500mm ± 20mm and then attempt to close again.</p> <p>The door will attempt to close for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is 500mm ± 20mm.</p> <p>PSC HMI will display 'Obstruction Detected' in Alarm Page.</p>		
		At Signalling Interface Simulator, turn the Open-Close switch to Open position to open the ASD and then turn the Open-Close switch to close the ASD	The door will open and close in normal speed		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Obstacle at 0.9m above FFL					
ST-1140	2 TS ID: [ORL_7551] [ORL_7576]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>When the door achieve the fully opened position, turn the Open-Close switch to Close position.</p> <p>During the closing process, place the obstacle rod at 0.9m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by 500mm ± 20mm (adjustable) upon detecting the obstruction.</p> <p>The ASD will delay for 2 second at reopen distance of 500mm ± 20mm and then attempt to close again. The door will attempt to close for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is 500mm ± 20mm.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>		
		At Signalling Interface Simulator, turn the Open-Close switch to Open position to open the ASD and then turn the Open-Close switch to close the ASD	The door will open and close in normal speed		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Obstacle at 1.2m above FFL					
ST-1140	3 TS ID: [ORL_7551] [ORL_7576]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>When the door achieve the fully opened position, turn the Open-Close switch to Close position.</p> <p>During the closing process, place the obstacle rod at 1.2m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by 500mm ± 20mm (adjustable) upon detecting the obstruction.</p> <p>The ASD will delay for 2 second at reopen distance of 500mm ± 20mm and then attempt to close again.</p> <p>The door will attempt to close for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is 500mm ± 20mm.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>		
		At Signalling Interface Simulator, turn the Open-Close switch to Open position to open the ASD, then turn the Open-Close switch to close the ASD	The door will open and close in normal speed		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Opening Obstacle Detection					
ST-1140	4 TS ID:	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position. Make sure the ASD is in closed and locked position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>Obstruct the door during door opening.</p>	The door will attempt to open for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.		
		At Signalling Interface Simulator, turn the Open-Close switch to Close position to close the ASD and then turn the Open-Close switch to open the ASD	The door will open and close in normal speed		

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A-9 HHPSD Portable Test Unit

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-1210	1 TS ID:-	Connect PTU laptop to DCU through RS232 cable. Launch the PTU software on the laptop	PTU will open and display the login page.		
	2 TS ID:-	Log in using the specified username and password.	Once logged in successfully, the "Door Overview" page in PTU will display.		
			Record down PTU software version		N.A.
	3 TS ID:-	In "Door Overview" Page, choose the communication port (e.g. COM6) and click DCU Connect.	Once connection is successful, DCU details will be shown.		
	4 TS ID:-	Go to "Doorway Information" section	Able to view details related to the doorway, such as DCU software version, doorway number, motor temperature, motor current, and door stroke.		
	5 TS ID:-	Go to "Alarm/Status".	DCU alarms and statuses are displayed.		
	6 TS ID:-	Go to "Config".	DCU configuration parameters are displayed.		
	7 TS ID:-	Select "Modify A Param", and select the parameter to change DCU obstacle number of re-try and reopening distance. Obstacle number of re-try is adjustable from 1-20, door re-opening distance is adjustable from 30cm to 100cm. Enter 20 for number of	The parameter values are modified.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
		re-tries and enter 30cm for re-opening distance and then click "Confirm."			
	8 TS ID:-	Click "Upload", select the configuration file, review the values, and confirm.	The status of the configuration parameters indicates success, and the values are updated.		
	9 TS ID:- [ORL_7551] [ORL_7576]	<p>Repeat step 7 and 8 to change number of re-tries to 1 and keep the re-opening distance at 30cm and test using obstacle plate.</p> <p>During the closing process, place the obstacle at 1.0m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by $300\text{mm} \pm 20\text{mm}$ (adjustable) upon detecting the obstruction.</p> <p>The ASD will de-delay for 2 second at reopen distance of $300\text{mm} \pm 20\text{mm}$ and then attempt to close again.</p> <p>The door will attempt to close for one time. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is $300\text{mm} \pm 20\text{mm}$.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>		

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A-10 HHPSD Acoustic Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
ST-1310	1 TS ID: [ORL_7557]	With all noise emitting equipment switched off, record the background noise level.	The value should be below 58dBA.		
	2 TS ID: [ORL_7559] [ORL_7560]	Open the door using the simulator and measure the noise level from the meter. Repeat for 3 times.	The average noise level is below 73 dBA	1. 2. 3. Av.	
	3 TS ID: [ORL_7559] [ORL_7560]	Close the door using the simulator and measure the noise level from the meter. Repeat for 3 times.	The average noise level is below 73 dBA	1. 2. 3. Av.	

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A-11 HHPSD ERM Manual Release Mechanism Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
ST-1410	1 TS ID: [ORL_7520] [ORL_7552]	<p>Close the ASD door mechanically until a fully closed & locked is achieved.</p> <p>Use the Test Key with the force gauge to unlock the doors.</p> <p>Record the force gauge value.</p>	The force measured on the force gauge for both door leaves are less than 67 N each and doors are manually able to push open.	LH: RH:	
		<p>Close the ASD door mechanically until a fully closed & locked is achieved.</p> <p>Pull the ERM using the force gauge to un-lock the doors.</p> <p>Record the force gauge value.</p>	The force measured on the force gauge for both door leaves are less than 67 N each and doors are manually able to push open.	LH: RH:	
	2 TS ID: [ORL_7520] [ORL_7552]	<p>Using ERM unlock ASD door</p> <p>Use the force gauge to measure the force required to operate the ASD to set the door in motion.</p> <p>Record the force gauge value.</p>	The force to manually push the door shall be less than 133N		

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A-12 HHPSD EED Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-1510	1 TS ID: [ORL_7511] [ORL_7539] [ORL_7583]	Push Panic Bar on EED with the force gauge to release the latch. Record the Force Gauge Value.	The force measured on the force gauge is less than 67 N and doors are manually able to push open The EOI illuminates in Red when the EED is opened.		
	2 TS ID:-	Continue to push the EED to set the door leaf in motion Record the Force Gauge Value.	The force to manually push the door shall be less than 133N		
	3 TS ID:-	Make sure EED is in closed and locked position. Turn EED bypass key switch to bypass position.	HMI Alarm page shows EED Bypass activated.		

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A-13 HHPSD Testing Completion

Test Identifier	Location	Date	Time	Lead Test Engineer signature	Witness name (BEM)	Witness name (CK)	Witness name (MRTA)
ST-1000	Singapore						
ST-1010	Singapore						
ST-1110	Singapore						
ST-1120	Singapore						
ST-1130	Singapore						
ST-1140	Singapore						
ST-1210	Singapore						
ST-1310	Singapore						
ST-1410	Singapore						
ST-1510	Singapore						

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Annex B – HHPSD Accelerated Life Cycle Test Record

B-1 Testing Commencement

Test Identifier	Location	Date	Time	Lead Test Engineer Name	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-2000	Singapore						

B-2 Test Record (Start)

Components	Check point description	Results (Left- view from platform side)		Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism					
i. Motor tooth belt and stopper	No visual crack or rupture				PASS / FAIL
ii. Belt tension	Visual check on adjuster bolt to be flush with tensioner bracket				PASS / FAIL
iii. Top guide rail	Measure the guiding slot	1.	1.		PASS / FAIL
		2.	2.		
		3.	3.		
		Av:	Av:		
2. Locking Block					
i. Locking latch	Measure the guiding profiles	1.	1.		PASS / FAIL
		2.	2.		
		3.	3.		
		Av:	Av:		

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
ii. Locking pin	Measure the locking pin diameter	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Mark all the fasteners			PASS / FAIL
3. Door Leaves				
i. Top nylon glider	Measure the glider thickness	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000±3mm Clear opening width between claddings is maintained			PASS / FAIL

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B-3 Test Record (250,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i. Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket			PASS / FAIL
iii. Top guide rail	Measure the guiding slot (the wear is allowed \leq 1mm from original size after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Mark all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Top nylon glider	Measure the glider thickness (the wear shall be \leq 1mm)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 \pm 3mm Clear opening width between claddings is maintained			

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B-4 Test Record (500,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i. Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket			PASS / FAIL
iii. Top guide rail	Measure the guiding slot (the wear is allowed \leq 1mm from original size after the test)	1. 2. 3.	1. 2. 3.	PASS / FAIL
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1. 2. 3.	1. 2. 3.	PASS / FAIL
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1. 2. 3.	1. 2. 3.	PASS / FAIL
iii. Fastener	Mark all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Top nylon glider	Measure the glider thickness (the wear shall be \leq 1mm)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 \pm 3mm Clear opening width between claddings is maintained			

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B-5 Test Record (750,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i. Motor tooth belt	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket			PASS / FAIL
iii. Top Guide Rail	Measure the guiding slot (the wear is allowed \leq 1mm from original size after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Mark all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Top Nylon Glider	Measure the glider thickness (the wear shall be \leq 1mm)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 \pm 3mm Clear opening width between claddings is maintained			

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B-6 Test Record (1,000,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i. Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket			PASS / FAIL
iii. Top guide rail	Measure the guiding slot (the wear is allowed \leq 1mm from original size after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Mark all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Top Nylon Glider	Measure the glider thickness (the wear shall be \leq 1mm)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 \pm 3mm Clear opening width between claddings is maintained			

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B-7 Event Log

The Event Log will be register based on any stoppage due to unforeseen event or during the quarter million cycle check.

	Tester	QA	Witness	Witness	Witness	Witness
Name:						
Signature:						
Date:						

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B-8 Testing Completion

Test Identifier	Location	Date	Time	Lead Test Engineer signature	Witness name (BEM)	Witness name (CK)	Witness name (MRTA)
ST-2000	Singapore						
ST-2000	Singapore						
ST-2000	Singapore						
ST-2000	Singapore						
ST-2000	Singapore						

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Annex C – FHPSD Function Test Record

C-1 Testing Commencement

Test Identifier	Location	Date	Time	Lead Test Engineer Name	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-5000	Singapore						
ST-5010	Singapore						
ST-5110	Singapore						
ST-5120	Singapore						
ST-5130	Singapore						
ST-5140	Singapore						
ST-5210	Singapore						
ST-5310	Singapore						
ST-5410	Singapore						
ST-5510	Singapore						

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C-2 Test Equipment Check

Test Equipment	Model/Serial No. (if any)	Calibration date
1) Insulation Tester (Megger)		
2) Digital Multi-meter		
3) Oscilloscope		
4) Linear Encoder	N/A	N/A
5) Frequency Converter	N/A	N/A
6) Handheld Tachometer		
7) Digital Force Gauge		
8) Sound Level Meter		
9) Obstacle Plate (10 mm x 40 mm x 200 mm)	N/A	N/A
10) Vernier Calliper		
11) Measuring Tape	N/A	N/A

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C-3 FHPSD Visual Inspection and Dimension Check

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-5000	1 TS ID:-	Physical Check (based on the drawing)	No visible dent, scratches.		
			Check the PSC/LCP is clean and is free of scrap wire and debris.		
			Check panel, covers and doors fit correctly and securely.		
			Check all cables are properly supported and tied.		
			Ensure all connections are terminated correctly into terminal blocks.		
			Check that the Earth Bar is of the approved cross section.		
			No abrupt irregularities or sharp edges are present		
			Verify colour of coating match approved colour code		
2 TS ID:-	Label Check		Proper Label on the PSC		
			Proper Label on the LCP		
			Proper Label on the DLCP		
			Proper Label on the DCU		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
	3 TS ID:-	Dimension Check	PSC Cabinet Dimension Height (without plinth):1800±5mm Width:1000±5mm Depth:400±2mm Plinth:200mm±2mm		
	4 TS ID:-	Dimension Check	ASD Frame Dimension Height:2050±5mm Width:974±5mm Depth:78.5±2mm		
		EED Frame Dimension	Height:2005±5mm Width:975±5mm Depth:78.5±2mm		
		FS Frame Dimension	Height:2050±5mm Width:1089±5mm Depth:78.5±2mm		
		LCP Dimension	Height:420±5mm Width:505±5mm		
		DLCP Dimension	Height:140±5mm Width:400±5mm		
		Anti-Climber Dimension	Height:129±5mm Width:974±5mm Depth:148±2mm		
		Vertical Gap Filler Dimension	Height:690±5mm Width:75±5mm		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
5 TS ID:-		Coating Thickness	ASD Frame MIN. Thickness 60µm		
			EED Frame MIN. Thickness 60µm		
			FS Frame MIN. Thickness 60µm		
			LCP MIN. Thickness 60µm		
			DLCP MIN. Thickness 60µm		
			Anti-Climber MIN. Thickness 60µm		

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C-4 FHPSD Insulation/Bonding Test on Prototype

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-5010	1 TS ID: [ORL_7541]	Insulation Test Point The test point 1 is between the threshold and ground	> 5 kΩ per platform when test under 500VDC		
		Insulation Test Point The test point 2 is between the upper supporting structural and the I-beam (simulated station Earth)	> 5 kΩ per platform when test under 500VDC		
		Insulation Test Point The test point 3 is between the rear cover structural and the I-beam	> 5 kΩ per platform when test under 500VDC		
	2 TS ID: [ORL_7540]	Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the threshold	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the LCP	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the DLCP	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the DCU casing	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the motor enclosure	<1Ω		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the ASD	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the EED	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the Header cover	<1Ω		
		Continuity Test Point Place one end of the probe to the copper bar (Header earth bar) and the other end to the ASD Frame	<1Ω		

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C-5 FHPSD PSC Functional Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-5110	1 TS ID: [ORL_7490]	On Signalling Interface Simulator: 1. Place the Auto/Manual switch in Manual position; 2. Place the Open/Close switch in Open position;	1. Doors Closed and Locked lamp is extinguished (at Signalling Interface Simulator) 2. The Doors Open lamp (DOI) should be illuminated. 3. HMI Door Overview Page will show 'ASD Opened' when ASD is in fully open position.		
	2 TS ID: [ORL_7492]	On Signalling Interface Simulator: 1. Keep the Auto/Manual switch in Manual position; 2. Place the Open/Close switch in Close position	. The Doors Open lamp (DOI) should be blinking and extinguished when ASD is fully closed and locked. 2. HMI Door Overview Page will show 'ASD Closed' when ASD is in closed and locked position.		
	3 TS ID: [ORL_7494]	When the door is fully closed and locked	1. Doors Closed and Locked lamp is illuminated on Signalling Interface Simulator 2. The Doors Open lamp (DOI) is extinguished. 3. HMI Door Overview Page will show 'ASD Closed' when ASD is in closed and locked position.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
	4 TS ID: [ORL_7494] [ORL_7532]	Check Door Closed and Locked loop when the door is fully closed: press any one of the limit switches using screwdriver	1. PSI is extinguished. 2. The Closed and Locked lamp is extinguished at Signalling Interface Simulator		
	5 TS ID: [ORL_7494] [ORL_7532]	Release the limit switch	1. PSI is illuminated. 2. The Closed and Locked lamp is illuminated at Signalling Interface Simulator		
	6 TS ID: [ORL_7551]	On Signalling Interface Simulator: 1. Keep the Auto/Manual switch S*61 in Manual position; 2. Turn the Open/Close switch S*62 in Close position 3. While the door is closing, turn off DCU	The door will stop in its current position and door not slam		
	7 TS ID: [ORL_7551]	On Signalling Interface Simulator: 1. Keep the Auto/Manual switch S*61 in Manual position; 2. Turn the Open/Close switch S*62 in Open position 3. While the door is opening, turn off DCU	The door will stop in its current position and door not slam		

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C-6 FHPSD Door Operation Mode Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-5120	1 TS ID: [ORL_7517] [ORL_7569]	At LCP, turn the Auto-Close-Manual Enable key switch to Close position. At Signalling Interface Simulator, turn the Open-Close switch S*62 to Open position.	The door should not open. The Green PSI shall remain illuminated.		
	2 TS ID: [ORL_7569]	At LCP, turn the Auto-Close-Manual Enable key switch to Manual Enable position. At LCP, press the Open button.	The ASD should open. The DOI shall be blinking when the ASD is opening and remains illuminated when fully opened. The Green PSI shall not be illuminated.		
	3 TS ID: [ORL_7569]	At LCP, turn the Auto-Close-Manual Enable key switch to Close position.	The ASD should close. The DOI shall be blinking when the ASD is closing and shall not be illuminated when in the closed and locked position. The Green PSI shall be illuminated when the ASD is in closed and locked.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
	4 TS ID: [ORL_7495]	At LCP, turn the Auto-Close-Manual Enable key switch to Auto position. At LCP, turn the Interlock Override switch to ON position.	'Interlock Override' is not shown on HMI. PSI is not illuminated.		
	5 TS ID: [ORL_7495] [ORL_7535]	At LCP, turn the Auto-Close-Manual Enable key switch to Close position. At LCP, turn the Interlock Override switch to ON position.	'Interlock Override' is shown on HMI. PSI is illuminated in Green and blinking.		
	6 TS ID: [ORL_7536]	At LCP, turn the Interlock Override switch to OFF position.	'Interlock Override' is not shown on HMI. PSI is not illuminated.		
	7 TS ID: [ORL_7495]	At LCP, turn the Auto-Close-Manual Enable key switch to Manual Enable position. At LCP, turn the Interlock Override switch to ON position.	'Interlock Override' is not shown on HMI. PSI is not illuminated.		
	8 TS ID: [ORL_7518] [ORL_7569]	At DLCP, turn the Auto-Close-Manual Enable key switch to Manual Enable position. At DLCP, press the Open button.	The ASD should open. The DOI shall be blinking when the ASD is opening and remains illuminated when fully opened. The Green PSI shall not be illuminated.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
	9 TS ID: [ORL_7569]	At DLCP, turn the Auto-Close-Manual Enable key switch to Close position.	The ASD should close.		
			The DOI shall be blinking when the ASD is closing and shall not be illuminated when in the closed and locked position.		
			The Green PSI shall be illuminated when the ASD is in closed and locked.		
	10 TS ID: [ORL_7574]	Turn LCKS to Manual Position on the LCB and press the Close push button.	The DOI shall be blinking when the ASD is closing and shall not be illuminated when in the closed and locked position.		
	11 TS ID: [ORL_7580] [ORL_7592] [ORL_7593]	Turn LCKS to Isolation mode.	<p>The DOS is lighted on with steady red light.</p> <p>The door will be mechanically locked (cannot be opened manually using ERM/ staff key).</p> <p>The LCKS key is removable.</p>		

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C-7 FHPSD Door Motion Profile

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
ST-5130	1 TS ID: [ORL_7548]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Open position</p> <p>The door opening profile is shown on the oscilloscope waveform and read the opening time from the waveform</p>	Opening time measured from the oscilloscope is less than 3.0s		
	2 TS ID: [ORL_7548]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Close position.</p> <p>The door closing profile is shown on the oscilloscope waveform and read the opening time from the waveform</p>	Closing time measured from the oscilloscope is less than 3.5s		
	3 TS ID: [ORL_7548]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Open position</p> <p>The rate of distance travelled (speed) is measured by the handheld tachometer for the maximum opening speed and record the measured value.</p>	The speed measured from the handheld tachometer should be less than 0.5 m/s for both door leaves.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
	4 TS ID: [ORL_7548]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position, turn the Open-Close switch to Close position</p> <p>The rate of distance travelled (speed) is measured by the handheld tachometer for the maximum closing speed and record the measured value.</p>	The speed measured from the handheld tachometer should be less than 0.5m/s for both door leaves.		
	5 TS ID: [ORL_7547]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Close position.</p> <p>Stop and hold the door using the force gauge</p> <p>Record the closing force.</p>	The closing force should be less than 140N at any door leaf		
	6 TS ID: [ORL_7547]	<p>Use the weight of sliding door and refer the values from step 1~4 to calculate the kinetic energy when sliding door is moving at open/close K.E.=$\frac{1}{2}mv^2$. The unit of K.E. is Joule, mass is Kg and speed is m/s.</p> <p>Weight of door is 80kg per leaf.</p>	<p>The maximum kinetic energy should be less than 9.5J.</p> <p>The kinetic energy of last 150mm trip during closing should be less than 2J.</p>		

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C-8 FHPSD Obstacle Detection

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Obstacle at 0.3m above FFL					
ST-5140	1 TS ID: [ORL_7530] [ORL_7550] [ORL_7551] [ORL_7576]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>When the door achieve the fully opened position, turn the Open-Close switch to Close position.</p> <p>During the closing process, place the obstacle rod at 0.3m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by 500mm ± 20mm (adjustable) upon detecting the obstruction.</p> <p>The ASD will delay for 2 second at reopen distance of 500mm ± 20mm and then attempt to close again.</p> <p>The door will attempt to close for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is 500mm ± 20mm.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>		
		At Signalling Interface Simulator, turn the Open-Close switch to Open position to open the ASD and then turn the Open-Close switch to close the ASD	The door will open and close in normal speed		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Obstacle at 1.0m above FFL					
	2 TS ID: [ORL_7551] [ORL_7576]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>When the door achieve the fully opened position, turn the Open-Close switch to Close position.</p> <p>During the closing process, place the obstacle rod at 0.9m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by 500mm ± 20mm (adjustable) upon detecting the obstruction.</p> <p>The ASD will delay for 2 second at reopen distance of 500mm ± 20mm and then attempt to close again.</p> <p>The door will attempt to close for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is 500mm ± 20mm.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>		
		At Signalling Interface Simulator, turn the Open-Close switch to Open position to open the ASD and then turn the Open-Close switch to close the ASD	The door will open and close in normal speed		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Obstacle at 1.7m above FFL					
ST-5140	3 TS ID: [ORL_7551] [ORL_7576]	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>When the door achieve the fully opened position, turn the Open-Close switch to Close position.</p> <p>During the closing process, place the obstacle rod at 1.7m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by 500mm ± 20mm (adjustable) upon detecting the obstruction.</p> <p>The ASD will delay for 2 second at reopen distance of 500mm ± 20mm and then attempt to close again.</p> <p>The door will attempt to close for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is 500mm ± 20mm.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>		
		At Signalling Interface Simulator, turn the Open-Close switch to Open position to open the ASD and then turn the Open-Close switch to close the ASD	The door will open and close in normal speed		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/ Measurement	Result (Pass/Fail)
Opening Obstacle Detection					
ST-5140	4 TS ID:	<p>At Signalling Interface Simulator, turn the Auto-Manual switch to Manual position. Make sure the ASD is in closed and locked position.</p> <p>At Signalling Interface Simulator, turn the Open-Close switch to Open position.</p> <p>Obstruct the door during door opening.</p>	<p>The door will attempt to open for three consecutive times. As the obstacle is still being detected, the door will stop at obstacle position.</p>		
		<p>At Signalling Interface Simulator, turn the Open-Close switch to Close position to close the ASD and then turn the Open-Close switch to open the ASD</p>	<p>The door will open and close in normal speed</p>		

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C-9 FHPSD Portable Test Unit

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-5210	1 TS ID:-	Connect PTU laptop to DCU through RS232 cable. Launch the PTU software on the laptop	PTU will open and display the login page.		
	2 TS ID:-	Log in using the specified username and password.	Once logged in successfully, the "Door Overview" page in PTU will display.		
			Record down PTU software version		N.A.
	3 TS ID:-	In "Door Overview" Page, choose the communication port (e.g. COM6) and click DCU Connect.	Once connection is successful, DCU details will be shown.		
	4 TS ID:-	Go to "Doorway Information" section	Able to view details related to the doorway, such as DCU software version, doorway number, motor temperature, motor current, and door stroke.		
	5 TS ID:-	Go to "Alarm/Status".	DCU alarms and statuses are displayed.		
	6 TS ID:-	Go to "Config".	DCU configuration parameters are displayed.		
	7 TS ID:-	Select "Modify A Param", and select the parameter to change DCU obstacle number of re-try and reopening distance. Obstacle number of re-try is adjustable from 1-20, door re-opening distance is adjustable from 30cm to 100cm. Enter 20 for number of re-tries and enter 30cm for re-opening distance	The parameter values are modified.		

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Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
		and then click "Confirm."			
8 TS ID: -	Click "Upload", select the configuration file, review the values, and confirm.	The status of the configuration parameters indicates success, and the values are updated.			
9 TS ID: -[ORL_7551] [ORL_7576]	<p>Repeat step 7 and 8 to change number of re-tries to 1 and keep the re-opening distance at 30cm and test using obstacle plate.</p> <p>During the closing process, place the obstacle at 1.0m height above FFL in between of the moving doors.</p>	<p>The door set shall reopen by $300\text{mm} \pm 20\text{mm}$ (adjustable) upon detecting the obstruction.</p> <p>The ASD will de-lay for 2 second at reopen distance of $300\text{mm} \pm 20\text{mm}$ and then attempt to close again.</p> <p>The door will attempt to close for one time. As the obstacle is still being detected, the door will stop at obstacle position.</p> <p>Check if the reopening distance is $300\text{mm} \pm 20\text{mm}$.</p> <p>HMI will display 'Obstruction Detected' in Alarm Page.</p>			

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C-10 FHPSD Acoustic Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
ST-5310	1 TS ID: [ORL_7557]	With all noise emitting equipment switched off, record the background noise level.	The value should be below 58dBA.		
	2 TS ID: [ORL_7559] [ORL_7560]	Open the door using the simulator and measure the noise level from the meter. Repeat for 3 times.	The average noise level is within 73 dBA	1. 2. 3. Av.	
	3 TS ID: [ORL_7559] [ORL_7560]	Close the door using the simulator and measure the noise level from the meter. Repeat for 3 times.	The average noise level is within 73 dBA	1. 2. 3. Av.	

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C-11 FHPSD ERM Manual Release Mechanism Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations/Measurement	Result (Pass/Fail)
ST-5410	1 TS ID: [ORL_7520] [ORL_7552]	<p>Close the ASD door mechanically until a fully closed & locked is achieved.</p> <p>Use the Test Key with the force gauge to unlock the doors.</p> <p>Record the force gauge value.</p>	The force measured on the force gauge for both door leaves are less than 67 N each and doors are manually able to push open.	LH: RH:	
		<p>Close the ASD door mechanically until a fully closed & locked is achieved.</p> <p>Pull the ERM using the force gauge to unlock the doors.</p> <p>Record the force gauge value.</p>	The force measured on the force gauge for both door leaves are less than 67 N each and doors are manually able to push open.	LH: RH:	
	2 TS ID: [ORL_7520] [ORL_7552]	<p>Using ERM unlock ASD door</p> <p>Use the force gauge to measure the force required to operate the ASD to set the door in motion.</p> <p>Record the force gauge value.</p>	The force to manually push the door shall be less than 133N		

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C-12 FHPSD EED Test

Test ID	Req. Ref.	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-5510	1 TS ID: [ORL_7511] [ORL_7539] [ORL_7583]	Push Panic Bar on EED with the force gauge to release the latch. Record the Force Gauge Value.	The force measured on the dial indicator of the force gauge is less than 67 N and doors are manually able to push open. The EOI Blink in Red when the EED is opened.		
	2 TS ID:-	Continue to push the EED to set the door leaf in motion Record the Force Gauge Value.	The force to manually push the door shall be less than 133 N		
	3 TS ID:-	Make sure EED is in closed and locked position. Turn EED bypass key switch to bypass position.	HMI Alarm page shows EED Bypass activated.		

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C-13 FHPSD Testing Completion

Test Identifier	Location	Date	Time	Lead Test Engineer signature	Witness name (BEM)	Witness name (CK)	Witness name (MRTA)
ST-5000	Singapore						
ST-5010	Singapore						
ST-5110	Singapore						
ST-5120	Singapore						
ST-5130	Singapore						
ST-5140	Singapore						
ST-5210	Singapore						
ST-5310	Singapore						
ST-5410	Singapore						
ST-5510	Singapore						

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Annex D – FHPSD Accelerated Life Cycle Test Record

D-1 Testing Commencement

Test Identifier	Location	Date	Time	Lead Test Engineer Name	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-6000	Singapore						

D-2 Test Record (Start)

Components	Check point description	Results (Left- view from platform side)		Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism					
i. Motor tooth belt and stopper	No visual crack or rupture				PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket	1.	1.		PASS / FAIL
		2.	2.		
		3.	3.		
		Av:	Av:		
2. Locking Block					
i. Locking latch	Measure the guiding profiles	1.	1.		PASS / FAIL
		2.	2.		
		3.	3.		
		Av:	Av:		
ii. Locking pin	Measure the locking pin diameter	1.	1.		PASS / FAIL
		2.	2.		
		3.	3.		
		Av:	Av:		

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
iii. Fastener	Mark all the fasteners			PASS / FAIL
3. Door Leaves				
i. Bottom nylon guide	Measure the nylon guide thickness	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000±3mm Clear opening width between claddings is maintained			PASS / FAIL

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D-3 Test Record (250,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i. Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Marking all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Bottom Nylon Guide	Measure the nylon guide thickness (the wear shall be $\leq 1\text{mm}$)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 $\pm 3\text{mm}$ Clear opening width between claddings is maintained			PASS / FAIL

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D-4 Test Record (500,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Marking all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Bottom Nylon Guide	Measure the nylon guide thickness (the wear shall be $\leq 1\text{mm}$)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 $\pm 3\text{mm}$ Clear opening width between claddings is maintained			PASS / FAIL

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D-5 Test Record (750,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Marking all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Bottom Nylon Guide	Measure the nylon guide thickness (the wear shall be $\leq 1\text{mm}$)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 $\pm 3\text{mm}$ Clear opening width between claddings is maintained			PASS / FAIL

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D-6 Test Record (1,000,000)

Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
1. Drive Unit and Mechanism				
i. Motor tooth belt and stopper	No visual crack or rupture			PASS / FAIL
ii. Belt tension	Visual Check on adjuster bolt to be flush with tensioner bracket	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
2. Locking Block				
i. Locking latch	Measure the guiding profiles (the wear is allowed \leq 1mm after the test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
ii. Locking pin	Measure the locking pin diameter (the wear shall be \leq 1mm after test)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
iii. Fastener	Marking all the fasteners (no movement after the test)			PASS / FAIL

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Components	Check point description	Results (Left- view from platform side)	Results (Right -view from platform side))	PASS / FAIL
3. Door Leaves				
i. Bottom Nylon Guide	Measure the nylon guide thickness (the wear shall be $\leq 1\text{mm}$)	1.	1.	PASS / FAIL
		2.	2.	
		3.	3.	
		Av:	Av:	
4. Door opening				
i. Clear opening width between claddings	2000 $\pm 3\text{mm}$ Clear opening width between claddings is maintained			PASS / FAIL

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D-7 Event Log

The Event Log will be register based on any stoppage due to unforeseen event or during the quarter million cycle check.

	Tester	QA	Witness	Witness	Witness	Witness
Name:						
Signature:						
Date:						

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D-8 Testing Completion

Test Identifier	Location	Date	Time	Lead Test Engineer signature	Witness name (BEM)	Witness name (CK)	Witness name (MRTA)
ST-6000	Singapore						
ST-6000	Singapore						
ST-6000	Singapore						
ST-6000	Singapore						
ST-6000	Singapore						

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	111 of 134
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Annex E – Punch List

Please refer to the attach punch list for reference. Sign-off Punch list will be attached in each test report submission.

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	112 of 134
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Annex F – Attendance Sheet

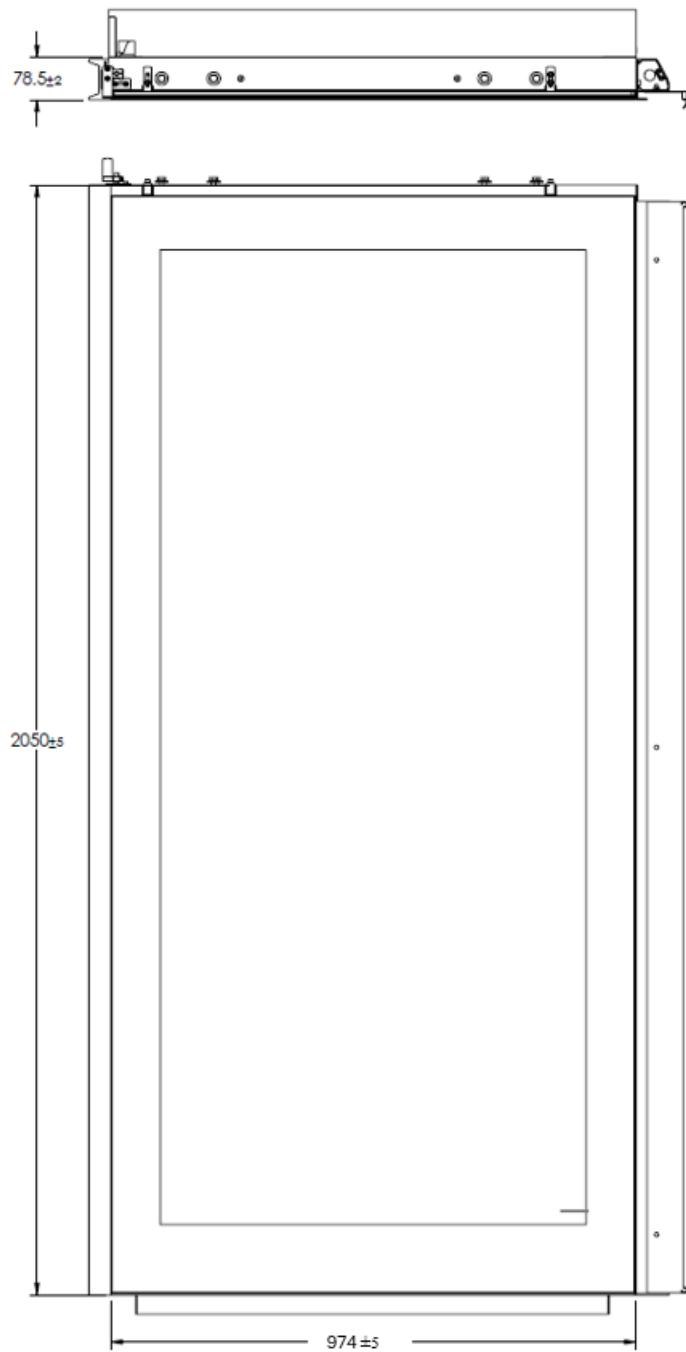
		ATTENDANCE SHEET		
Description:				
Date:				
Time:				
Venue:				
Coordinator:				
No.	Name	Designation	Signature	Organization
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle Submission no.: PSD-40002.B Uncontrolled if printed out or copied	113 of 134
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Annex G – FHPSD & HHPSD Drawings

G-1 FHPSD – ASD RH

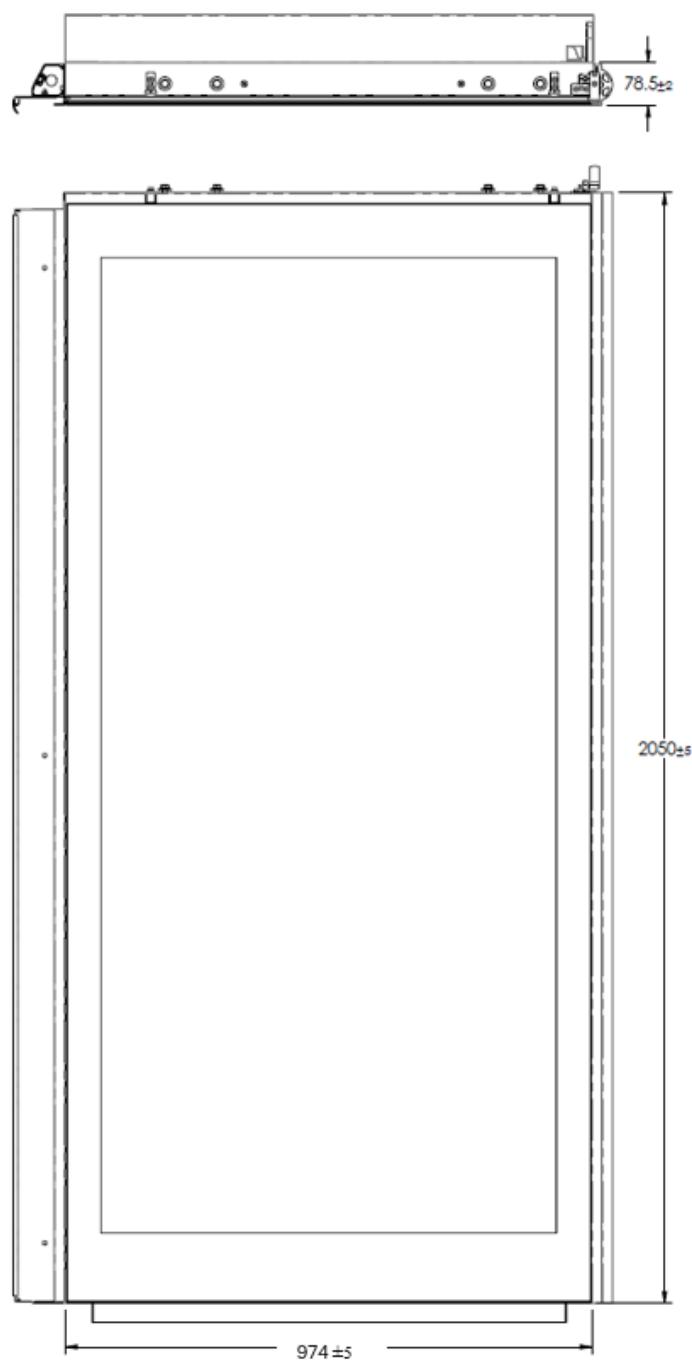


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	114 of 134
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G-2 FHPSD – ASD LH

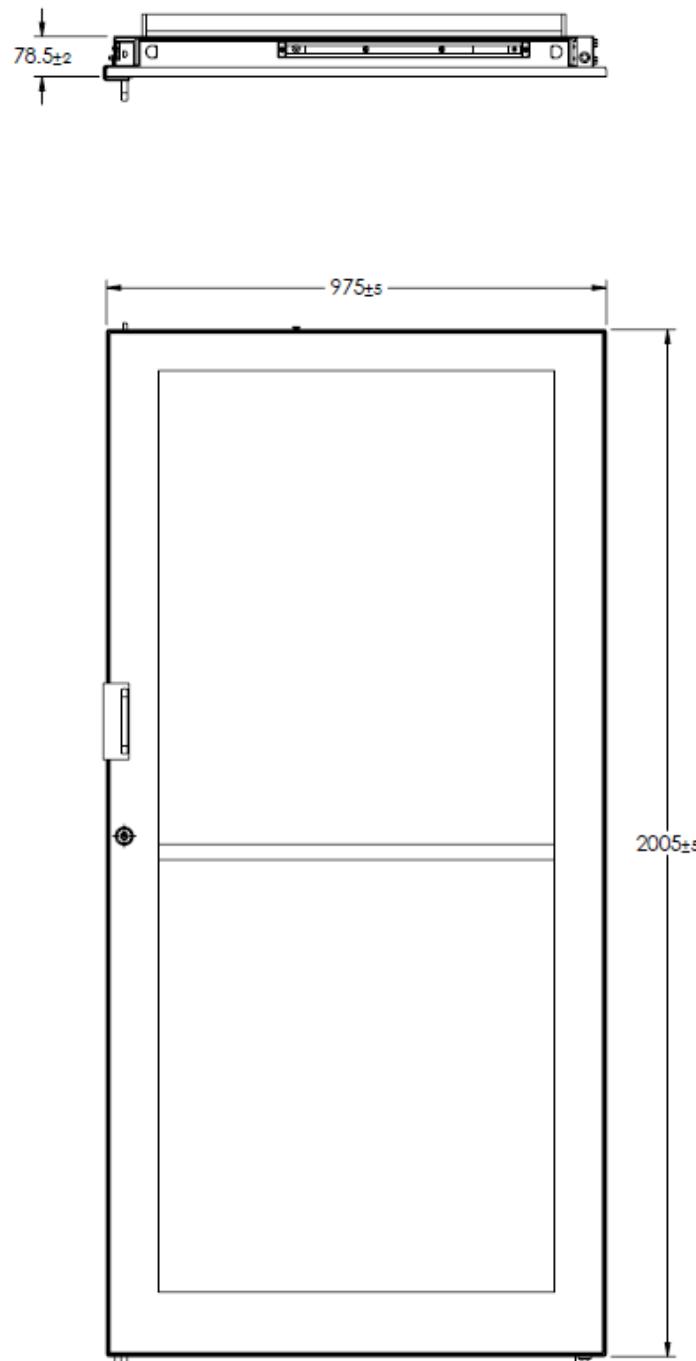


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	115 of 134
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G-3 FHPSD – EED / EWD

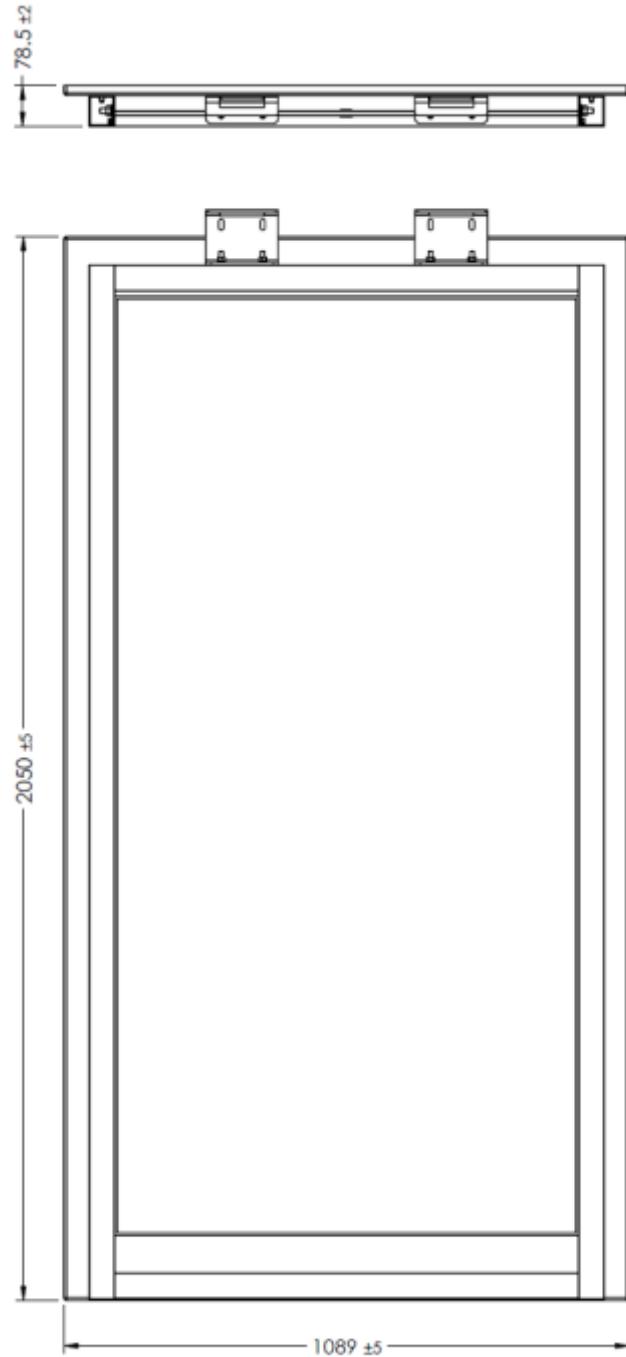


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	116 of 134
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G-4 FHPSD – FS

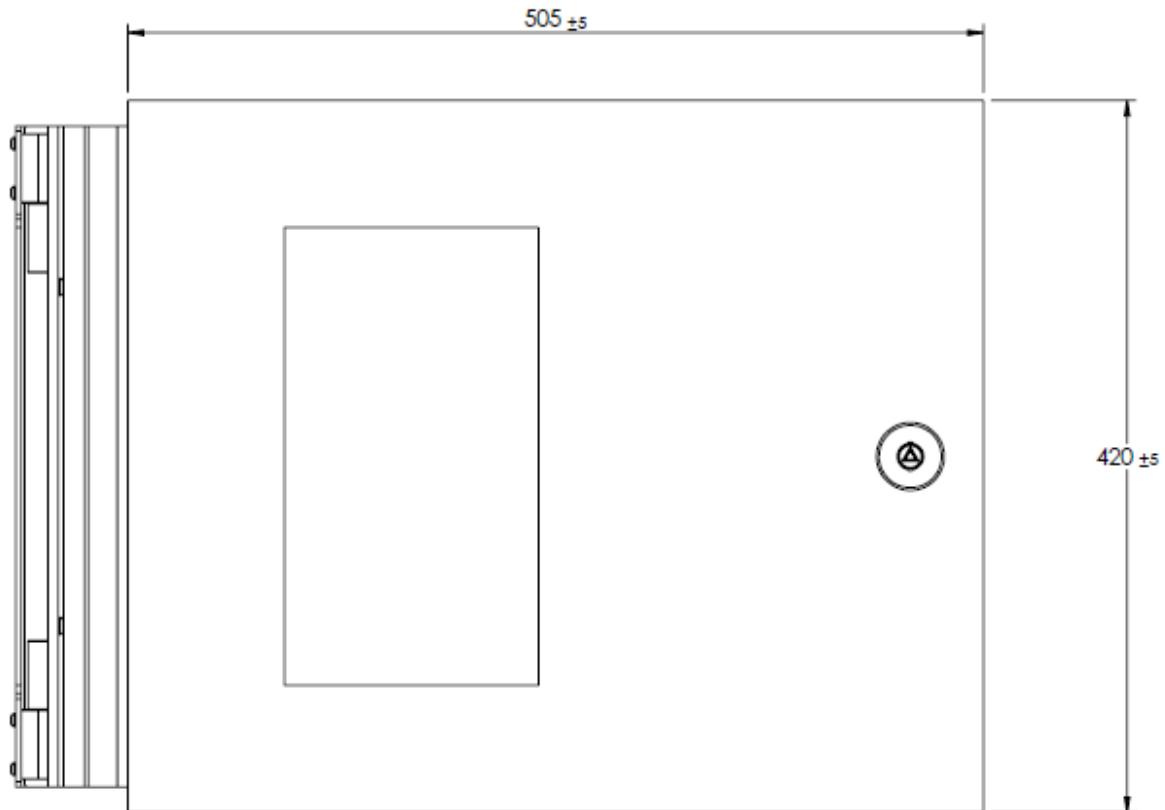


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	117 of 134
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G-5 FHPSD – LCP

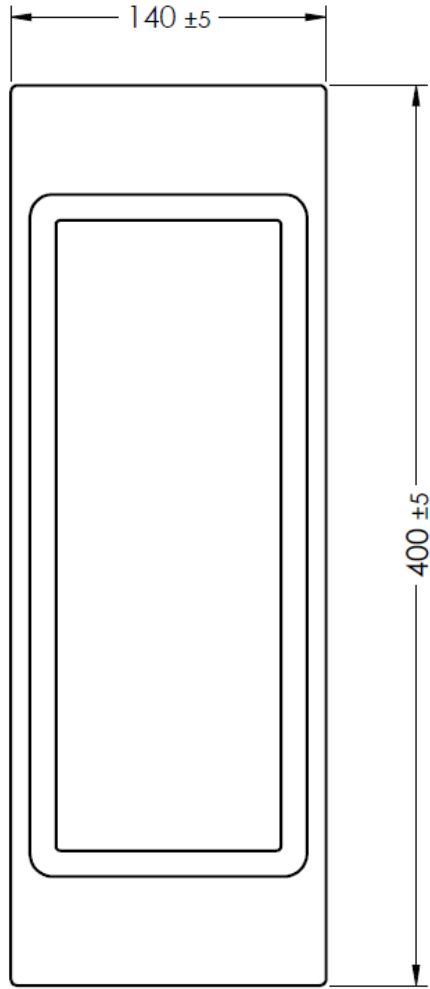


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle Submission no.: PSD-40002.B Uncontrolled if printed out or copied	118 of 134
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G-6 FHPSD – DLCP

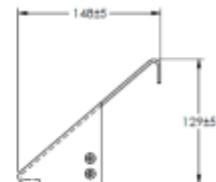


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	119 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	

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G-7 FHPSD – Anti Climber



Bangkok Expressway and Metro Plc.
CH.Karnchang Public Company Limited
Siemens Mobility / STE(TH) / Bozankaya

Protection Class: RESTRICTED

ORL-STE-PSD-PRC-40000002_B

05-Aug-2025

Platform Screen Doors
Test Procedure - PSD - Functional Prototype and
Accelerated Life Cycle

Submission no.: PSD-40002.B

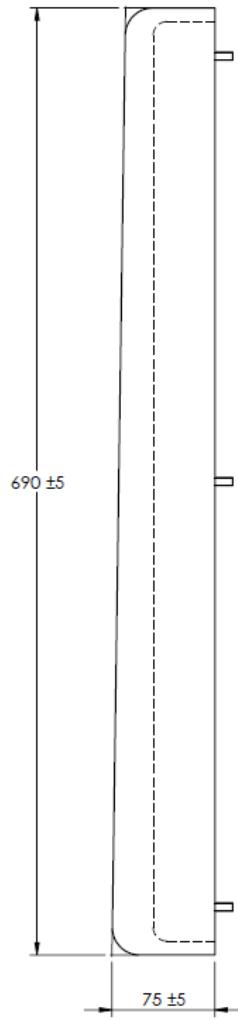
Uncontrolled if printed out or copied

120
of
134

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G-8 FHPSD – Crowd Guide

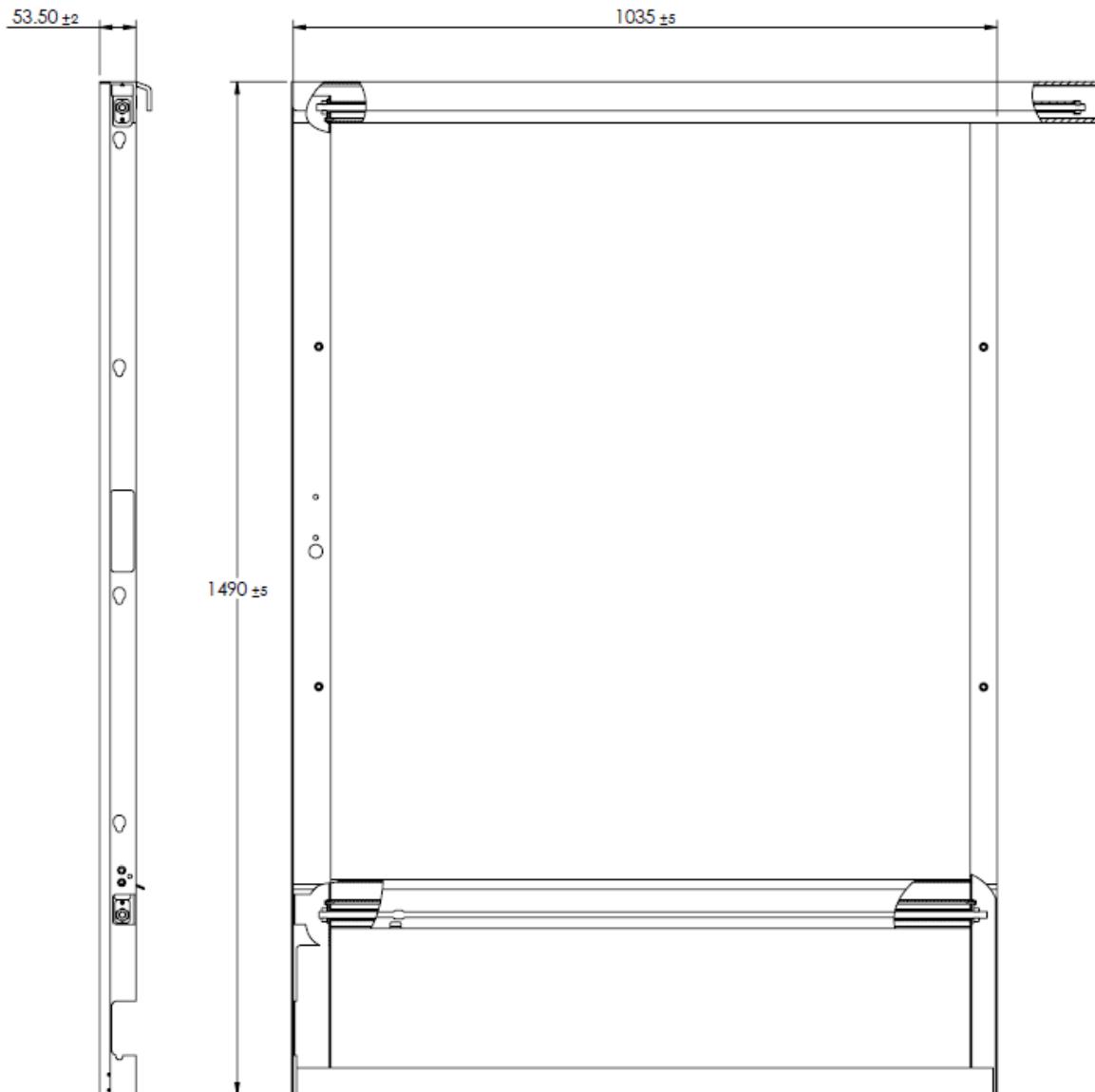


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	121 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	

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G-9 HHPSD – ASD LH

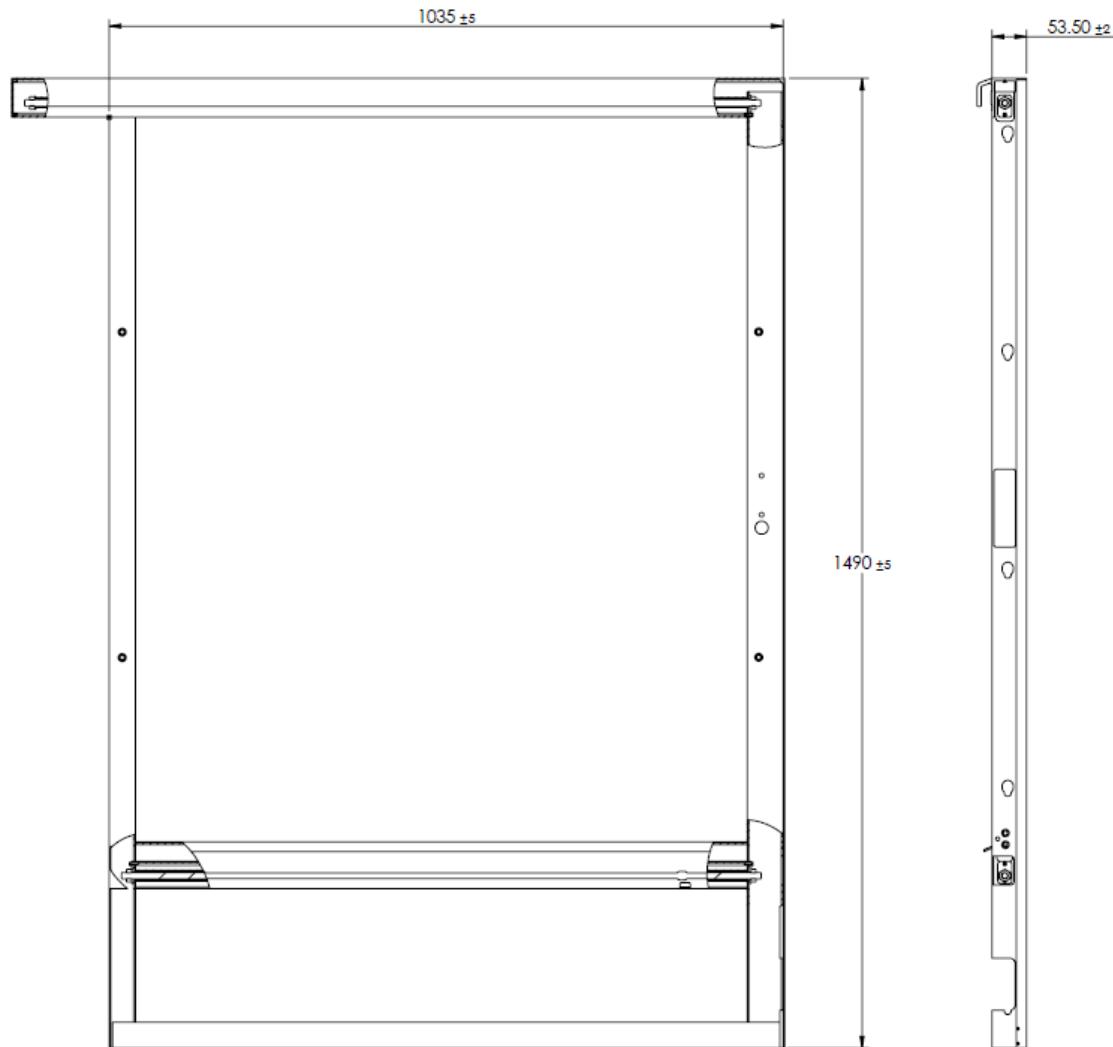


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle Submission no.: PSD-40002.B Uncontrolled if printed out or copied	122 of 134
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G-10 HHPSD – ASD RH

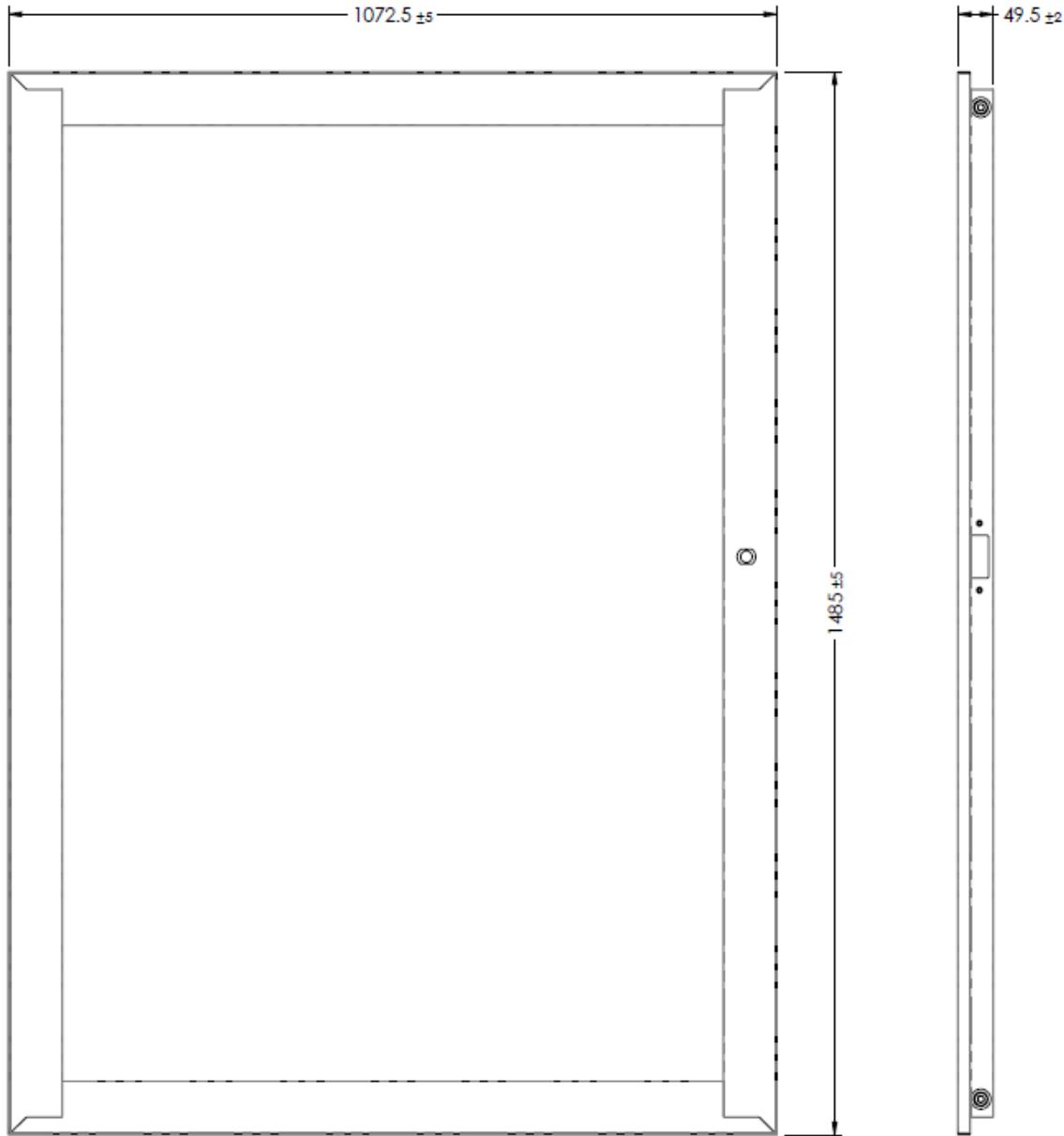


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle Submission no.: PSD-40002.B Uncontrolled if printed out or copied	123 of 134
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G-11 HHPSD – EED

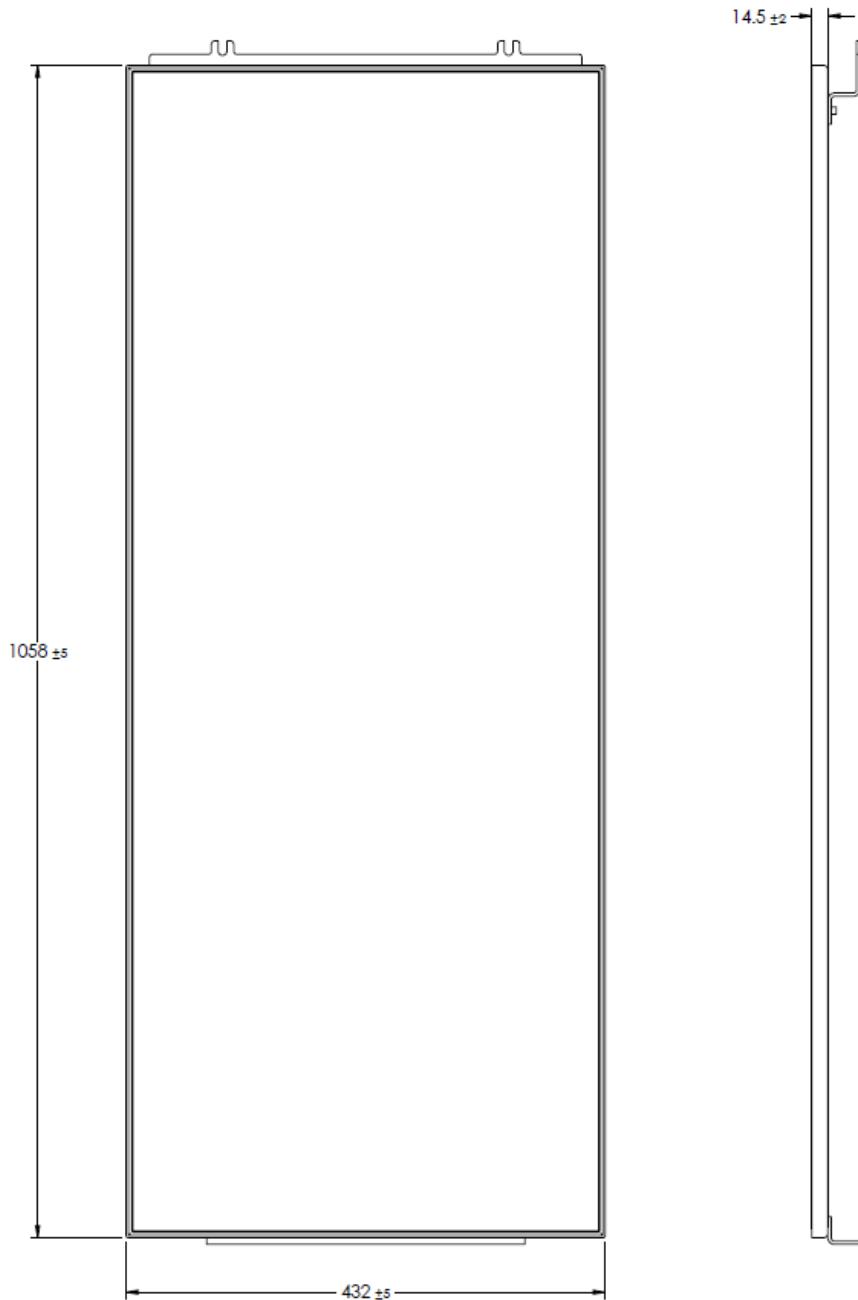


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	124 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	Submission no.: PSD-40002.B Uncontrolled if printed out or copied		

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Bang Khun Non - Min Buri (Suwinthawong) Section

G-12 HHPSD – FS II

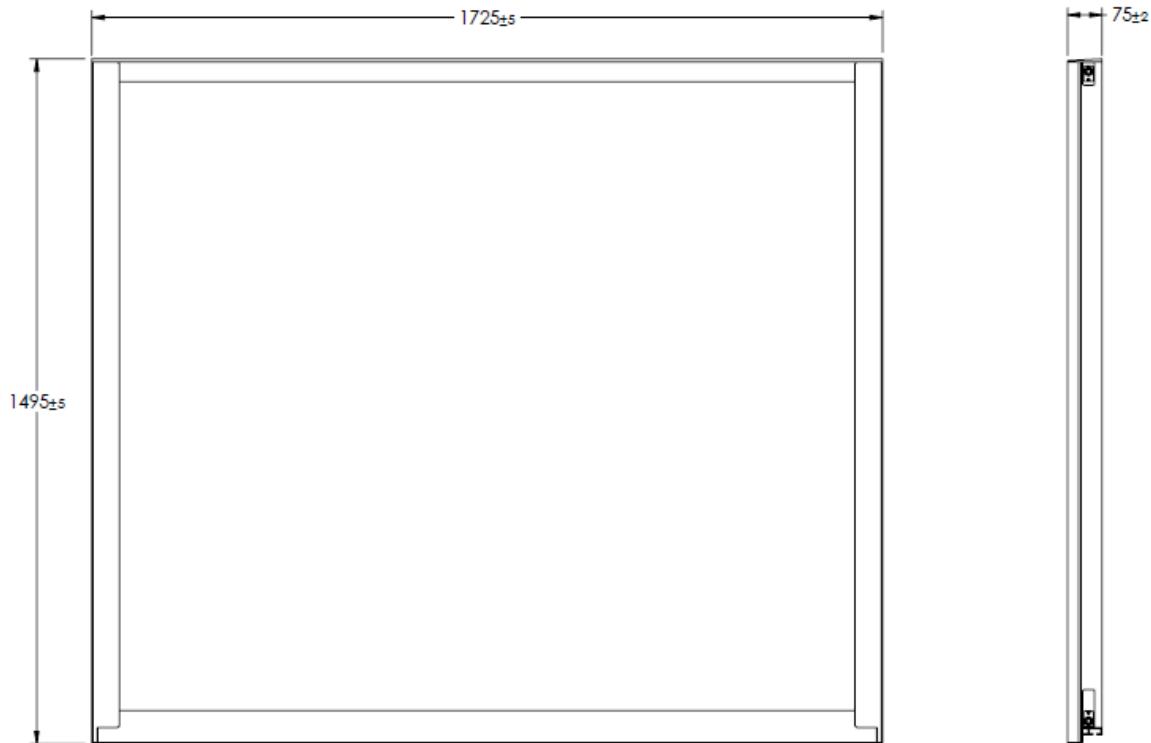


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	125 of 134
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G-13 HHPsd – FS IV

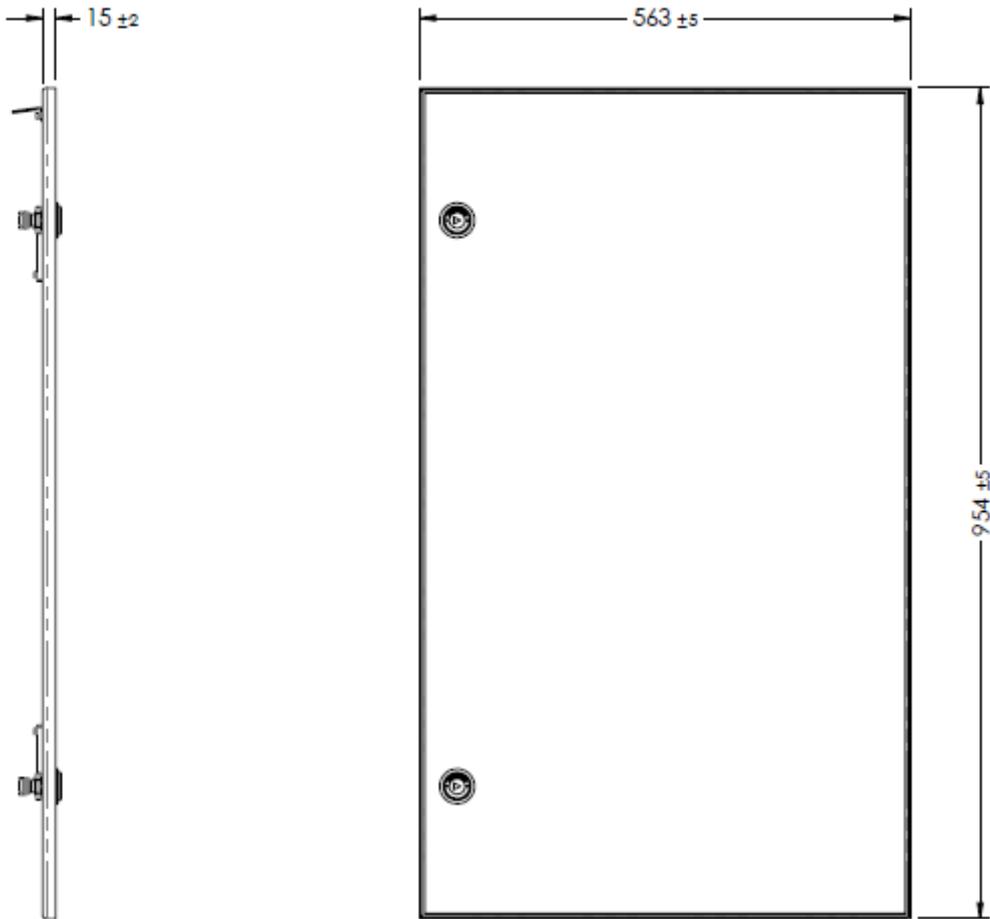


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	126 of 134
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G-14 HHPSD – FDP Subframe

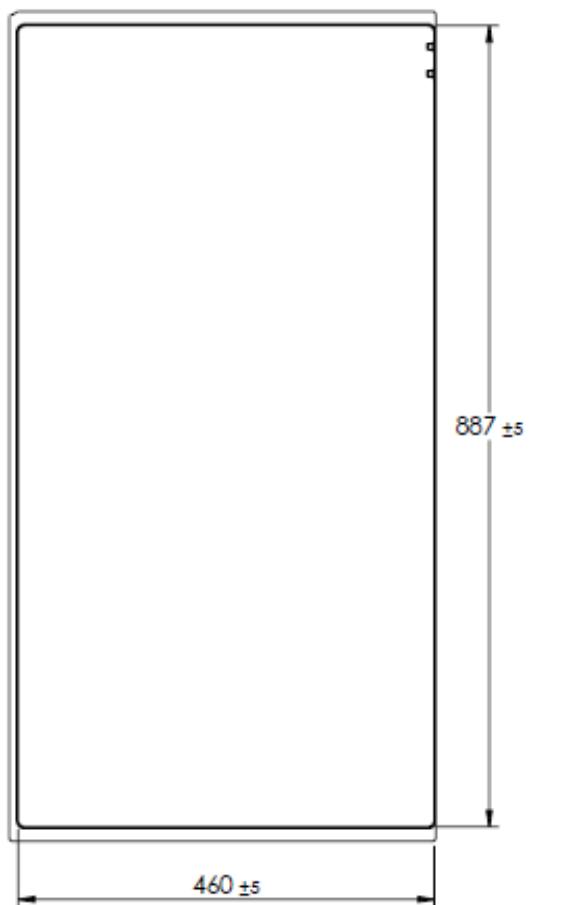


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	127 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	Submission no.: PSD-40002.B Uncontrolled if printed out or copied		

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G-15 HHPSD – LCD Enclosure



Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	128 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	

MRT Orange Line Project

Bang Khun Non - Min Buri (Suwinthawong) Section

G-16 HHPSD – Rear Gap Fillers

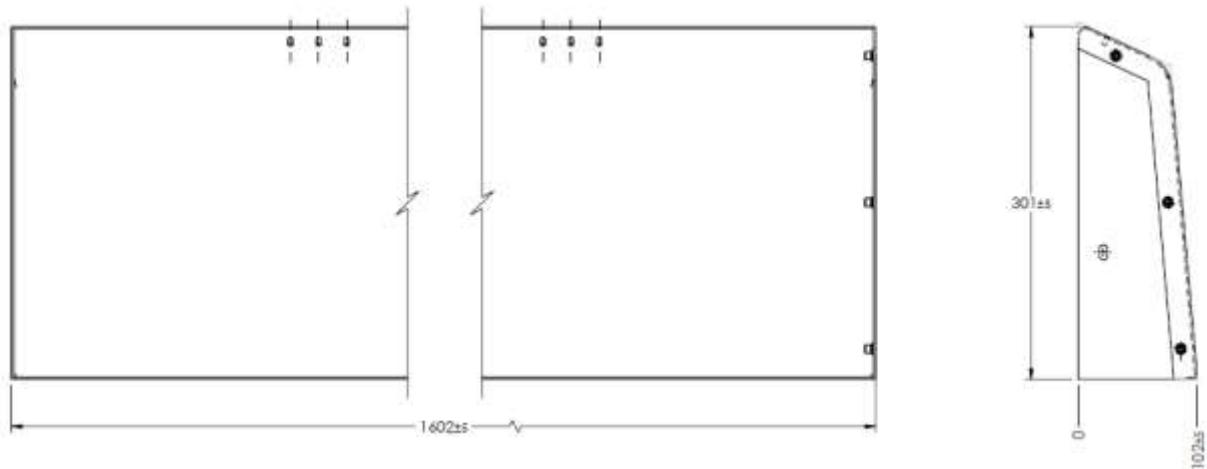


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	129 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	

MRT Orange Line Project

Bang Khun Non - Min Buri (Suwinthawong) Section

G-17 HHPsd – Rear Cover

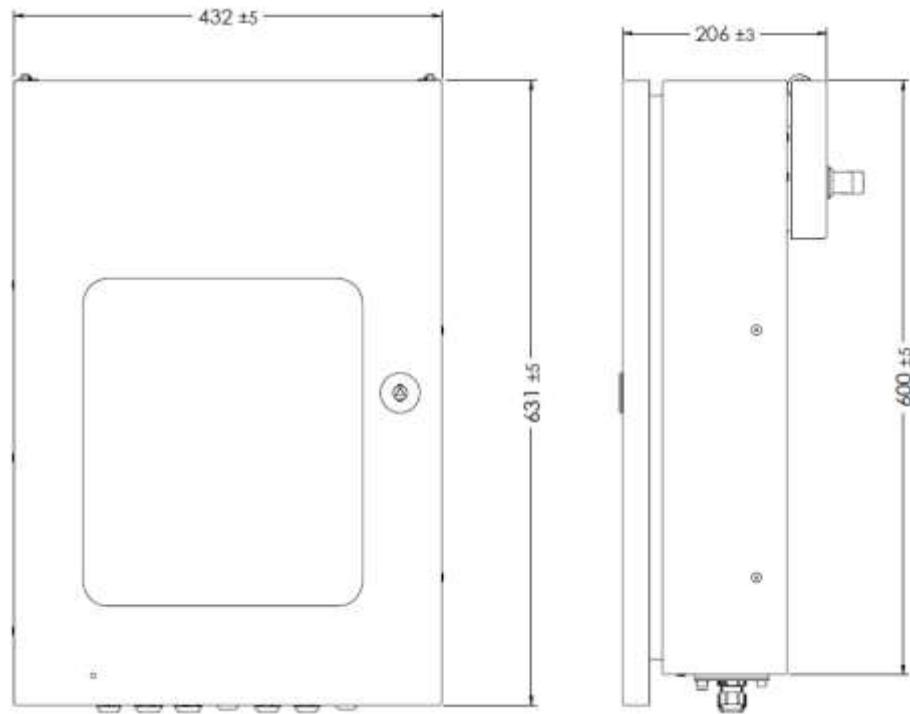


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	130 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	Submission no.: PSD-40002.B Uncontrolled if printed out or copied		

MRT Orange Line Project

Bang Khun Non - Min Buri (Suwinthawong) Section

G-18 HHPSD – LCP/ DLCP

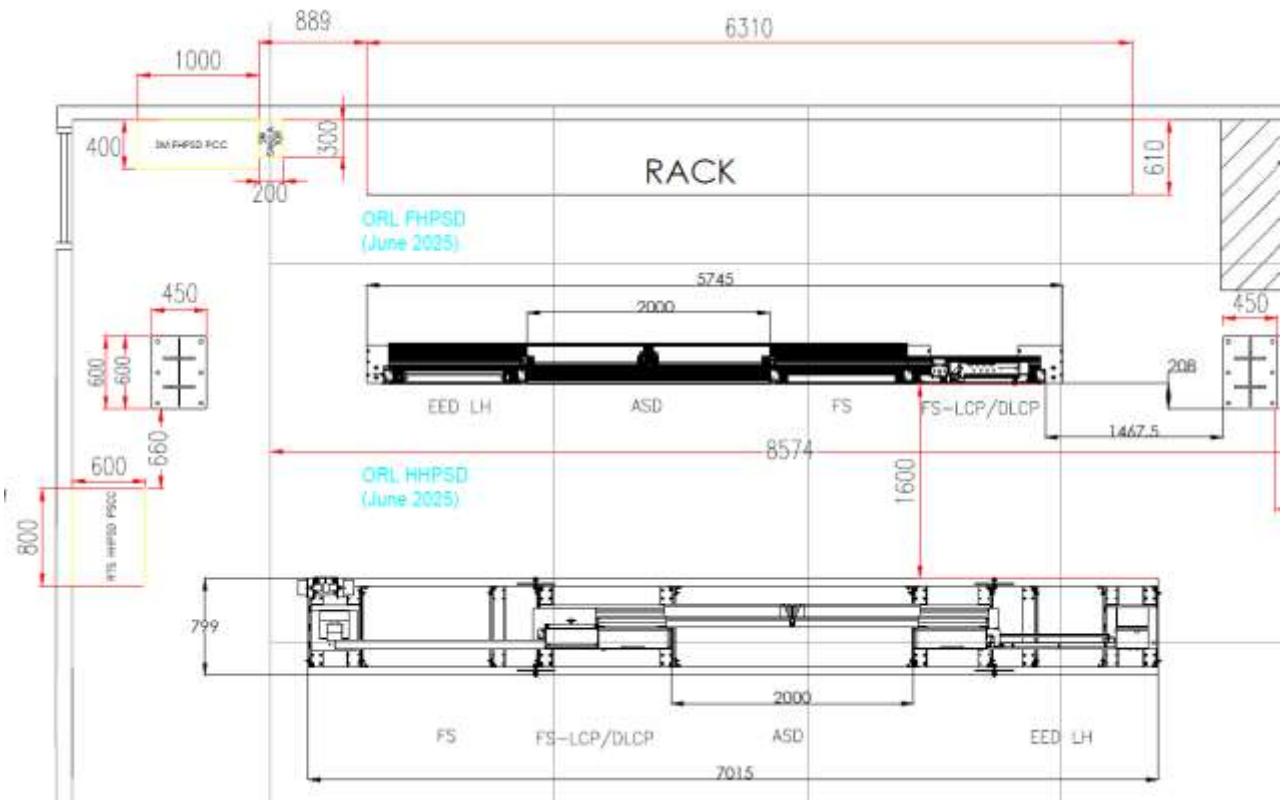


Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	131 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	

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Bang Khun Non - Min Buri (Suwinthawong) Section

G-19 HHPSD & FHPSD Prototype Layout



Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	132 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B	Submission no.: PSD-40002.B Uncontrolled if printed out or copied		

MRT Orange Line Project
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Annex H – HHPSD Maintenance Demonstration Test Record

H-1 Testing Commencement

Test Identifier	Location	Date	Time	Lead Test Engineer Name	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-3000	Singapore						

H-2 HHPSD Maintenance Demonstration Test Record (Start)

Test ID	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-3000	DCU Replacement	MTTR < 30 minutes		
	Belt Replacement	MTTR < 30 minutes		
	Motor Replacement (Master)	MTTR < 30 minutes		
	ASD Locking Block Replacement	MTTR < 30 minutes		
	ASD Glass Replacement	MTTR < 30 minutes		
	ERM Release Housing Replacement	MTTR < 30 minutes		
	PLC Replacement	MTTR < 30 minutes		
	One Switch Replacement at DLCP	MTTR < 30 minutes		

H-3 HHPSD Testing Completion

Test Identifier	Location	Date	Time	Lead Test Engineer signature	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-3000	Singapore						

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	133 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	

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Annex I – FHPSD Maintenance Demonstration Test Record

I-1 Testing Commencement

Test Identifier	Location	Date	Time	Lead Test Engineer Name	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-7000	Singapore						

I-2 FHPSD Maintenance Demonstration Test Record (Start)

Test ID	Test Item	Pass Criteria	Observations	Result (Pass/Fail)
ST-7000	DCU Replacement	MTTR < 30 minutes		
	Belt Replacement	MTTR < 30 minutes		
	Motor Replacement	MTTR < 30 minutes		
	ASD Locking Block Replacement	MTTR < 30 minutes		
	ASD Glass Replacement	MTTR < 30 minutes		
	ERM Release Housing Replacement	MTTR < 30 minutes		
	PLC Replacement	MTTR < 30 minutes		
	One Switch Replacement at DLCP	MTTR < 30 minutes		

I-3 FHPSD Testing Completion

Test Identifier	Location	Date	Time	Lead Test Engineer signature	Witness Name (BEM)	Witness Name (CK)	Witness Name (MRTA)
ST-7000	Singapore						

Bangkok Expressway and Metro Plc. CH.Karnchang Public Company Limited Siemens Mobility / STE(TH) / Bozankaya	05-Aug-2025	Platform Screen Doors Test Procedure - PSD - Functional Prototype and Accelerated Life Cycle	134 of 134
Protection Class: RESTRICTED ORL-STE-PSD-PRC-40000002_B		Submission no.: PSD-40002.B Uncontrolled if printed out or copied	