ELECTRICITY GENERATING AUTHORITY OF THAILAND

SUPPLEMENTAL NOTICE NO. 3

INVITATION TO BID NO. TIWS-S-04(R)

SUPPLY AND CONSTRUCTION OF 230 kV STATIC VAR COMPENSATOR AT KHLONG NGAE SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN WESTERN AND SOUTHERN REGIONS TO ENHANCE SYSTEM SECURITY

(TWO-ENVELOPE)

The attached Supplemental Notice shall be considered as part of the bidding documents No. TIWS-S-04(R).

As acknowledgement of receipt that all additions, deletions and revisions contained in this Supplemental Notice are incorporated into the above bidding documents, Bidder is requested to sign and return this acknowledgement via email address : Somsit.s@egat.co.th within three (3) days from the date of the announcement of this Supplemental Notice on http://www4.egat.co.th/fprocurement/biddingeng/.

The original acknowledgement which is manually signed in ink by a person or persons duly authorized shall be included in the proposal to be submitted on the bid opening date.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

January 15, 2020

ACKNOWLEDGEMENT

This undersigned Bidder hereby certifies that the additions, deletions and revisions set forth in this Supplemental Notice to Invitation to Bid No. TIWS-S-04(R) are incorporated as part of the above bidding documents and will be fully included in any bid which he may submit.

Signed _____

Title _____

Company _____

Date _____

ELECTRICITY GENERATING AUTHORITY OF THAILAND

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TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN WESTERN AND SOUTHERN REGIONS TO ENHANCE SYSTEM SECURITY

The following supplemental information is hereby given for the above described Invitation:

Volume I of IV

1. Section A : Invitation to Bid

   Postpone the price and technical proposals submission date from January 22, 2020 to ***January 29, 2020***.

2. Section H : Scope of Work

   Replace pages H29-H31 of Scope of Work with the revised pages with (Rev. 1) attached.

Volume II of IV

3. Section I : Ratings and Features

   Replace pages I2-I4 (Rev.1) of Ratings and Features with the revised pages with (Rev.2) attached.

Volume IVof IV

4. Section L : Drawings

   Replace Dwg No. TP-E-10.1 (Rev.6) with the revised one with (Rev.7) attached.

Bid submitted must be in accordance with this Notice. Receipt of this Notice shall be acknowledged by the Bidder on the proposal included in the Bidding Documents in the space provided on page Part 3-C19, Article C-5 Supplemental Notices.

ELECTRICITY GENERATING
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January 15 , 2020

version 15.2.8 and the said SVC digital model shall be compatible with the latest version. The said SVC digital model shall comprise as follows:

- The SVC model in Root Mean Square (RMS) time domain simulation: this model is at least used for the SVC dynamic behavior studies.
- The SVC model in ElectroMagnetic Transients (EMT) time domain simulation: this model is at least used for harmonic studies and the SVC dynamic behavior studies during transient phenomena e.g. switching, fault, etc.

The said SVC digital model shall at least include the complete data for the main circuit components, configurations, function block diagrams along with the parameters, input and output variables of each function block along with their scale factors as well as flow charts and logic diagrams of the entire control features. The control and protection functions shall at least be as follows:

- All control functions which are required for both RMS and EMT investigations.
- AC undervoltage/overvoltage protection.

Moreover, the necessary parameters for the said SVC control and protection functions to input the SVC operating point as well as the necessary parameters for the external grid e.g. short circuit level, nominal voltage, nominal frequency, etc. shall be accessible and adjustable.

The performance of the said SVC digital model for both step test and scenario test shall be verified by comparing to the corresponding Factory Acceptance Test (FAT) results from Real Time Digital Simulator (RTDS) which shall be the responsibility of the Contractor. The said comparison report shall be submitted to EGAT for approval before commissioning. The scenarios which will be provided after the Award of Contract are as follows:

- For the SVC model in RMS time domain simulation, maximum ten (10) scenarios on one (1) AC reduced network which has minimum short circuit level.
- For the SVC model in EMT time domain simulation, maximum ten (10) scenarios on one (1) AC reduced network which has minimum short circuit level.

Five (5) copies of CD-ROM containing the said final SVC digital model and the details of the modified parameters in case there are some improvements during commissioning shall be delivered to EGAT at the completion.

89. The studies of control interaction between the SVC with coordinated MSCs and the existing HVDC shall prove that there is no negative interaction among them. EGAT shall have access to all data necessary for complete understanding of the studies as well as the validity of the results.

Unless otherwise specified, the said control interaction studies shall be done by the offline simulation and shall be studied based on the following existing HVDC model data which will be provided after the Award of Contract:

- HVDC model in PSCAD transient version *4*.
- HVDC model in PSS/E version 32.

- HVDC model design reports of ***RMS*** time domain simulations.

- Four (4) AC reduced networks in DIgSILENT PowerFactory format.

In case there are different formats between the data used in the studies and the given data, the verification reports shall be done by the Contractor and submitted to EGAT for approval. ***In addition, maximum three (3) scenarios will be provided after the Award of Contract.*** Moreover, the SVC voltage reference range of 0.95 – 1.05 p.u. shall be comprehensively considered in the said control interaction studies.

The study reports shall at least clearly show the following details:

- Study cases.

- All used data such as parameters, equations, standards, tools, and etc.

- Study methods.

- Study results such as interested variables shown in time-domain simulation.

- Conclusion.

The study cases shall include but not be limited to the following cases:

- All HVDC sub-bank switching combinations as shown in Table 21 at the minimum short circuit level.

  - Type A: 230 kV filter sub-bank, triple tuned 12/24/36 harmonic, 42 MVAr
  - Type B: 230 kV filter sub-bank, triple tuned 12/24/36 harmonic, 84 MVAr
  - Type C: 230 kV capacitor sub-bank, 84 MVAr

Filter combination	Normal current limits I_{DC} at Normal DC voltage		Normal current limits I_{DC} at 70% DC voltage	
	Rectifier	Inverter	Rectifier	Inverter
1A 0B 0C	350 A	350 A	215 A	215 A
2A 0B 0C	1050 A	900 A	700 A	680 A
0A 1B 0C	1050 A	1050 A	700 A	680 A
2A 0B 1C	1250 A	1200 A	810 A	785 A
2A 0B 2C	1650 A	1650 A	900 A	850 A
2A 0B 3C	1650 A	1650 A	1000 A	1000 A
1A 1B 0C	1650 A	1650 A	1000 A	1000 A

Table 21 : DC current limits for different filter combinations.

This study shall include but not be limited to the following issues:

- ***Transient overvoltage :*** ***this issue shall be divided into two (2) parts; the changes of instantaneous voltage and the changes of root mean square (rms) voltage. The purpose is to examine the voltage stress due to the transient overvoltage on the equipment including both the existing equipment and the SVC equipment. The transient overvoltage shall be within practical acceptable range, i.e., not causing equipment damage.***

In case there is damage on the equipment which is caused by the SVC interaction, the Contractor shall be responsible for providing the corrective measures in order to mitigate the transient overvoltage imposed on both the existing equipment and the SVC equipment.

On the other hand, in case there is damage on the equipment which is not caused by the SVC interaction, the Contractor shall recommend the mitigation and mark as the operating restriction.

- ***SVC output : this issue is to demonstrate that there shall be the proper cooperation among them. The SVC with coordinated MSCs shall not cause any restrictions to the HVDC filter combination. This includes determining the necessary parameters such as SVC reactive power output, voltage at the point of connection, firing angle of TCR, and etc.***

- HVDC Reactive Power Control (RPC) function which consists of reactive power control (Q-mode) and AC voltage control (U-mode).

  This study is to find out the proper setting values of the existing HVDC RPC function which shall allow the SVC with coordinated MSCs to operate initially and continuously until they nearly reach the maximum capability. Then, the RPC function will operate for both undervoltage and overvoltage conditions (dynamic performance).

  - The following HVDC stability functions:
  - power run-up function
  - power run-back function
  - frequency limit control function

  This study is to ensure that the SVC with coordinated MSCs shall not conflict with the HVDC stability functions.

- POD function

  This study is to design the SVC POD controller and find out the proper setting values for which the effects of the HVDC Power Swing Damping (PSD) function and other power system stabilizer of nearby generators are properly considered. The study shall be conducted for both enabled and disabled HVDC PSD function. The SVC POD function and its performance shall be tested and verified using RTDS during FAT. In addition, the maximum ten (10) scenarios per each AC reduced network for the study will be provided after the Award of Contract.

The concept of all studies including the Contractor's required data shall be submitted to EGAT during Bidding stage. However, the preliminary result of the POD function study shall be submitted to EGAT before FAT. The final results of all studies shall be submitted to EGAT for approval before commissioning.

a.	Type	Power-Transformer, 3 Phases, Outdoor, Oil Immersed	
b.	Rated Frequency	50	Hz
c.	Nominal System Voltage		
	-HV Side	230	kV
	-LV Side	xx	kV
	-TV Side	-	kV
d.	Max. Continuous System Voltage		
	-HV Side	xx	kV
	-LV Side	xx	kV
	-TV Side	-	kV
e.	Cooling Class	ONAN / ONAF / ONAF	
f.	Rated Capacity		
	-HV Side	150 / 200 / 250	MVA
	-LV Side	150 / 200 / 250	MVA
	-TV Side	-	MVA
g.	Rated Voltage		
	-HV Side	230	kV
	-LV Side	xx	kV
	-TV Side	-	kV
	Rated Current		
	-HV Side	376.53 / 502.04 / 627.55	A
	-LV Side	xx	A
	-TV Side	-	A
h.	Insulation Level (BIL) of Winding		
	-HV Side	1050	kV
	-LV Side	xx	kV
	-TV Side	-	kV
	-Neutral	150	kV
i.	Insulation Level (BIL) of Bushing		
	-HV Side	1175	kV (See Note5)
	-LV Side	xx	kV
	-TV Side	-	kV
	-Neutral	150	kV
j.	Creepage Distance of Bushing		
	-HV Side	≥ xx*	mm
	-LV Side	≥ xx*	mm
	-TV Side	≥ -	mm
	-Neutral	≥ 280	mm
k.	Connection of Windings		
	-HV Side	Ground Wye	
	-LV Side	Delta	
	-TV Side	-	
l.	Voltage Vector Group of Winding		
	-HV Side and LV Side	Yd1	
	-LV Side and TV Side	-	
	-HV Side and TV Side	-	

Note xx : Optimized by Manufacturer and Complied with SVC RF No. SV83T3.
* : Special Creepage Distance base on 25 mm/kV_{maxL-L}

m. Positive Sequence Impedance at Rated Voltage			
-HV Side to LV Side		xx %	(250 MVA Base)
-LV Side to TV Side		≥ -	(MVA Base)
-HV Side to TV Side		≥ -	(MVA Base)
n. Off Load Tap Changer		-	
o. On Load Tap Changer (Base on Rated Voltage)		-	
p. Temperature Class of Winding Insulation		120	
q. Winding Temperature Rise when Carrying Max. Continuous Rated Capacity			
- Winding Average		≤ 60	°C
- Winding Hottest Spot		≤ 75	°C
- Top Oil		≤ 60	°C
r. Average Audible Sound Pressure Level at Rated Voltage and Frequency			
-Without Fan		≤ 74	dB(A)
-With Fan		≤ 76	dB(A)
s. Surge Arrester, Station Class, Tank Mounted;			
HV Side (see detail in RF SA8Y11)			
-Qty. per Phase		1	
-Voltage Rating		192	kV
LV Side (see detail in RF -)			
-Qty. per Phase		1	
-Voltage Rating		xx	kV
TV Side (see detail in RF -)			
-Qty. per Phase		-	
-Voltage Rating		-	kV
t. Bushing Current Transformer			
HV Side	-Qty. per Phase	xxx	
	-Accuracy Class	xx	
	-Ratio	xx	
LV Side	-Qty. per Phase	xx	
	-Accuracy Class (Core #1)	xx	
	-Accuracy Class (Core #2)	xx	
	-Ratio (Core #1)	xx	
	-Ratio (Core #2)	xx	
TV Side	-Qty. per Phase	-	
	-Accuracy Class	-	
	-Ratio (Inside Delta)	-	
	-Ratio (Outside Delta Core #1)	-	
	-Ratio (Outside Delta Core #2)	-	

Note xx : Optimized by Manufacturer and Complied with SVC RF No. SV83T3..
xxx : Optimized by Manufacturer. (Qty. per Phase not less than 2)

u. Parallel Operation Requirement (between HV and LV side)
- [x] Not Required
- [ ] With Future Transformer or Each Other in the same Substation
- [ ] With Existing Transformer in accordance with Dwg. No. _____ attached

v. Max. Permissible Shipping Weight - tons (See Note1)

w. Max. Permissible Shipping Dimension - m x - m x - m (W×L×H) (See Note1)

x. Limitation of Transformer Foundation
-Foundation Plan Dimension -
-Max. Permissible Load (Total Weight of Transformer) -
-Max. Eccentric Distance of the Center of Gravity from the Foundation Plan's Center -

y. Max. Overall Dimension -

z. Applicable Standards IEEE Std. C57.12

Note : 1. Exception to the weight and dimension limitation stated in Article : Clearance and Weight Limitations.

2. The positive sequence impedance from HV side to LV side shall have a tolerance of ±5% of specified value.

3. The transformer shall be designed to withstand the following fault occurrence rates with the expected transformer life of 25 years.

Current Intensity	Times/Year
100 %	1
50 %	20
20 %	100

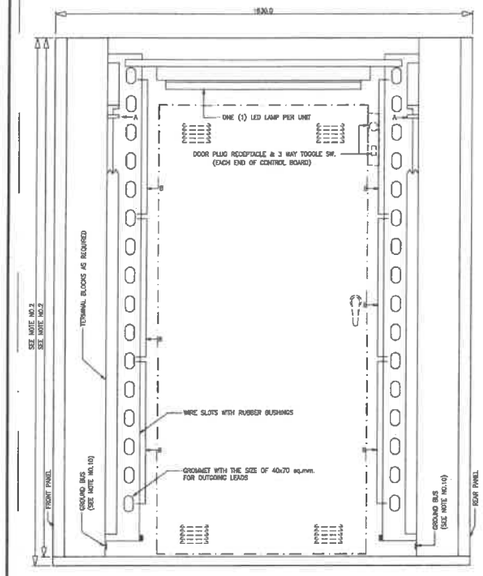
Where the 100 % current intensity means the maximum value of the short circuit current.

4. The dielectric test shall be tested according to maximum system voltage at 362kV on latest IEEE Std. C57.12. The induced voltage test shall be tested at 360 kV (phase-to-ground) for enhanced 7200 cycle and 315 kV (phase-to-ground) for one hour. The lightning impulse test shall be tested at 1,050 kV.

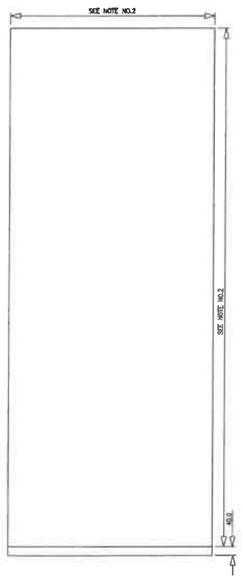
5. The HV bushing shall be operated and have the type test report for nominal system voltage 345kV according to latest IEEE C57.19.01.

DWG.NO. TP – E – 10.1 | REV. –

MAIN CONTROL BOARD–DUPLEX TYPE

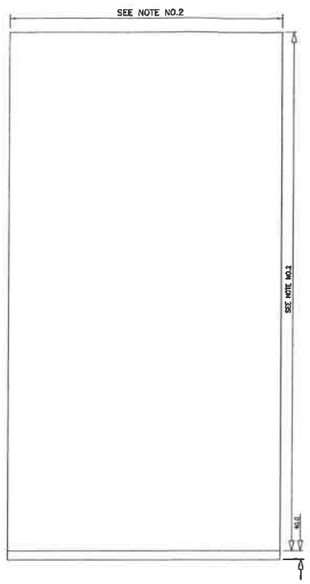


SIDE SECTION VIEW TYPICAL UNIT

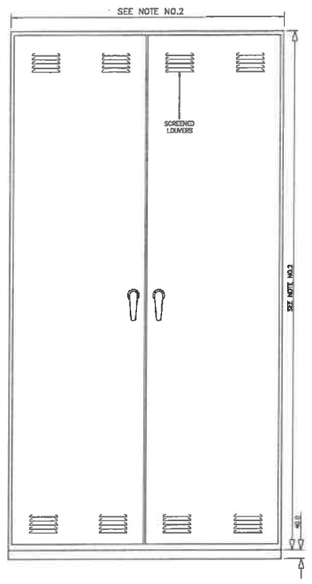


FRONT VIEW TYPICAL UNIT

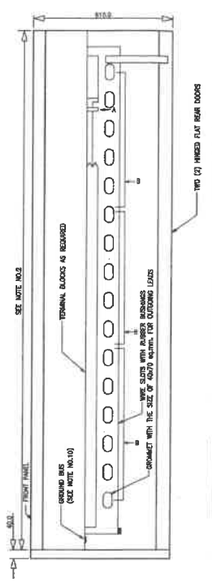
CONTROL SWITCHBOARD–ENCLOSED TYPE



FRONT VIEW TYPICAL UNIT

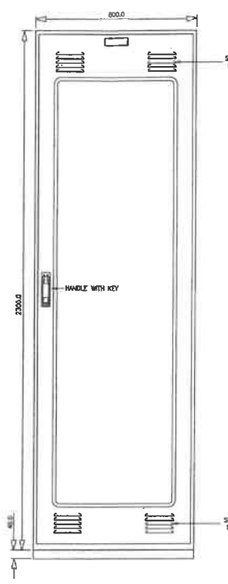


REAR VIEW TYPICAL UNIT

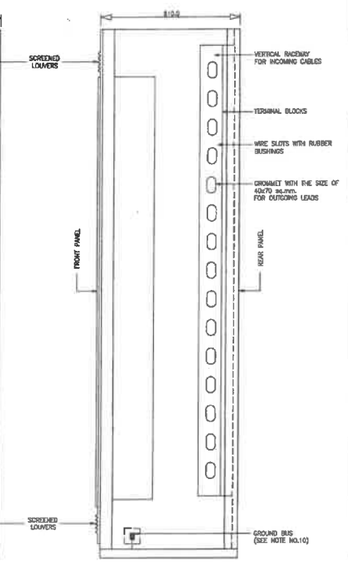


SIDE SECTION VIEW TYPICAL UNIT

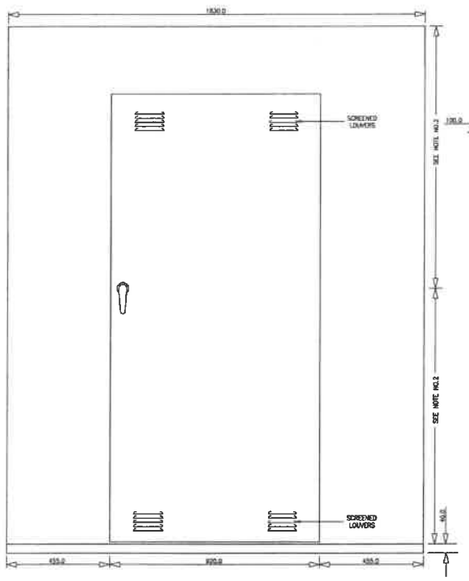
SWING RACK TYPE
PROTECTIVE RELAY SWITCHBOARD



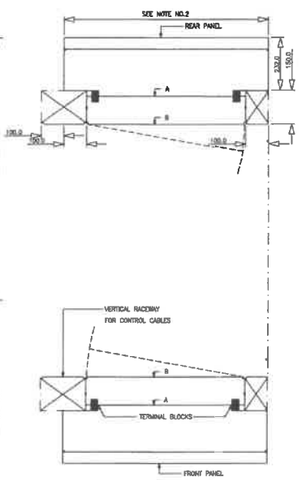
FRONT VIEW TYPICAL UNIT



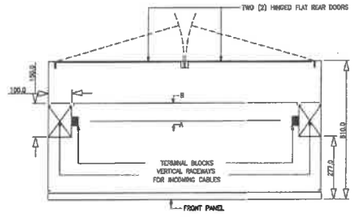
SIDE SECTION VIEW TYPICAL UNIT



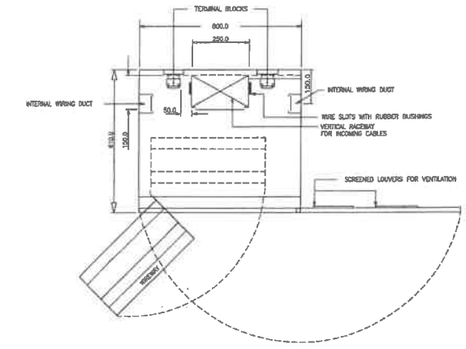
SIDE VIEW WITH ACCESS DOOR



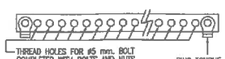
TOP SECTION VIEW TYPICAL UNIT



TOP SECTION VIEW TYPICAL UNIT



TOP SECTION VIEW TYPICAL UNIT



DETAILS OF GROUND BUS (FRONT VIEW)

LEGENDS

A – STATIONARY AUXILIARY EQUIPMENT MOUNTING STRAPS AS REQUIRED.
B – HINGED AUXILIARY EQUIPMENT RACKS AS REQUIRED.

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. PANEL WIDTH & HEIGHT FOR EACH SUBSTATION SHALL BE INDICATED ON DRAWING ENTITLED: MAIN CONTROL BOARD EQUIPMENT LAYOUT, CONTROL SWITCHBOARD EQUIPMENT LAYOUT AND PROTECTIVE RELAY SWITCHBOARD EQUIPMENT LAYOUT.
3. THE PANEL EXCEPT THE WIREWAY SHALL BE ASSEMBLED FROM NOT LESS THAN No. 2.5 mm LEVELED SHEET STEEL AND FORMED STEEL MEMBERS AS REQUIRED TO FORM A RIGID SELF–SUPPORTING STRUCTURE.
4. THE DEGREE OF PROTECTION SHALL BE AT LEAST IP3X AS PER IEC 60529.
5. THE INSIDE AND OUTSIDE OF THE PANEL SHALL BE FINISH–PAINTED WITH ANSI 61 MEDIUM GRAY OR RAL 7036 SEMI GLOSS.
6. THE RELAY RACK ASSEMBLY SHALL BE ABLE TO SWING THROUGH NOT LESS THAN 120° FROM THE CLOSED POSITION AND BE INSTALLED WITH TOOLS TO HOLD IT OPEN.
7. THE FLOOR CLOSING PLATES SHALL BE STRONG ENOUGH TO WITHSTAND AT LEAST 100 kg.
8. THE VERTICAL RACEWAY SHALL BE MADE FROM STEEL.
9. EACH GROUND BUS SHALL BE PUNCHED A ROW OF HOLES AND EQUIPPED WITH BOLTS AND NUTS FOR USING THROUGHOUT THE GROUND BUS.
10. A 6 mm BY 25 mm OR 5 mm BY 30 mm CROSS–SECTION BARE COPPER GROUND BUS COMPLETED WITH SOLDERLESS LUGS FOR TERMINATING No. 4/0 AWG STRANDED COPPER GROUND CABLES SHALL BE PROVIDED AT THE BOTTOM OF EACH PANEL. THE 25 mm OR 30 mm SIDE OF THE COPPER GROUND BUS SHALL BE PERPENDICULAR TO THE BOTTOM OF THE PANEL.
11. THE LED LAMP FOR DUPLEX TYPE PANEL SHALL AT LEAST BE 18 W. THE LED LAMP FOR OTHER TYPE PANEL SHALL AT LEAST BE 9 W.
12. THIS DRAWING SHOWS GENERAL REQUIREMENTS FOR THE CONSTRUCTION OF THE PANEL. THE CONTRACTOR SHALL SUBMIT THE DETAILED DESIGN DRAWINGS TO EGAT FOR APPROVAL.

CABINET NO. W1
RUN NO. 1630

ISO 9001 TSE81999
CAD CENTER
DO NOT AMEND MANUALLY

REV.NO.	JOB NO.	JOB DESCRIPTION	DRAWN	DESIGNED	VERIFIED	VALIDATED	RECOMMENDED	CONCURRED	APPROVED	DATE
7	–	REVISE THE DEFINITION FOR SWING RACK'S DEPTH	P.Rakneung	–	–	–	–	–	–	–
6	–	REVISE THE SIZING OF TERMINAL LUG FOR GROUNDING CABLE, THE SIZING OF DUPLEX VERTICAL RACEWAY, CONTROL SWITCHBOARD–ENCLOSED TYPE LAYOUT AND NOTES	P.Rakneung	–	–	–	–	–	–	–
5	–	ADDITION OF SCREENED LOUVERS	P.Jirasak	–	–	–	–	–	–	–
4	–	ADDITIONAL NOTE 7.	S.Thinnakorn	–	–	–	–	–	–	–
3	–	REVISE THE POSITION OF A VERTICAL RACEWAY IN THE SWING RACK TYPE, ADDITINNAL NOTES 4,5,6.	J.Surapong	–	–	–	–	–	–	–

$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$Filename
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$Date
$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$Name

ELECTRICITY GENERATING AUTHORITY OF THAILAND

DRAWN	P. RAKNEUNG	VALIDATED CHIEF, CONTROL AND PROTECTION SYSTEM ENGINEERING DEPARTMENT	DRAWING NAME: TYPICAL DRAWING
DESIGNED	P. RAKNEUNG	RECOMMENDED ASSISTANT DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION–1	DESCRIPTION OF DETAIL DRAWING: MAIN CONTROL BOARD AND PROTECTIVE RELAY SWITCHBOARD DUPLEX, ENCLOSED AND SWING RACK TYPE
VERIFIED		CONCURRED DIRECTOR, TRANSMISSION SYSTEM ENGINEERING DIVISION	
APPROVED		DATE 27/11/19 ASSISTANT GOVERNOR – TRANSMISSION SYSTEM DEVELOPMENT	JOB NO. / REPLACING DWG.NO. / DWG.NO. TP – E – 10.1 / REV. 7