การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย

REGISTRATION FORM

INVITATION TO BID NO. TS12-S-21 and TIPN-S-04

FOR SUPPLY AND CONSTRUCTION OF 230/115 kV LAMPHUN 3 SUBSTATION (GIS),
EXPANSION OF 115 kV CHOM THONG SUBSTATION, AND IMPROVEMENT OF 230 kV MAE MOH 3, 230 kV MAE MOH 4,
230 kV CHIANG MAI 3, 230 kV LAMPHUN 2 AND 115 kV HANG CHAT SUBSTATIONS
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

AVAILABLE DURATION FOR PURCHASING November 19, 2019 TO December 27, 2019

PRICE USD 480.- OR THB 15,000.-

COMPLETE DATA IS REQUIRED FOR THE BIDDER'S OWN BENEFITS
(โปรดกรอกรายละเอียดให้ครบถ้วนเพื่อประโยชน์ของบริษัท)

Step 1 : Fill out this Registration Form in English (Typing is preferred)
Step 2 : Submit this form for payment at Receivable Cashier Section (1st Floor, TOR 100 Bldg., Counter 4-8) Tel no. 02 436 5512
Step 3 : Bring the payment receipt and the copy of filled-out Registration Form to receive the bidding documents at International Procurement Department - Transmission Segment (Room No. 1202/2, 12th Floor, Building Tor. 101) Tel no. 02 436 0341-42

FOR PURCHASER				**TAX ID :**
NO.		**RECEIPT NO. :**	**DATE :**	**PURCHASER (ผู้ซื้อ):**
BIDDER'S NAME (บริษัทผู้ซื้อเอกสาร)				
ADDRESS (ที่อยู่)				
				COUNTRY :
ATTN. (ผู้รับผิดชอบ)**:**			**FAX NO.:**	**TEL.:**
E-mail :				
LOCAL REPRESENTATIVE (ตัวแทนในประเทศ)				
ADDRESS (ที่อยู่)				
				TAX ID :
ATTN. (ผู้รับผิดชอบ)**:**			**FAX NO.:**	**TEL.:**
E-mail :				

FOR PROCUREMENT OFFICER		**CHANGE OF BIDDER'S NAME**	**TAX ID :**
BIDDER'S LETTER NO. :			**DATED :**
NEW BIDDER'S NAME (ชื่อผู้ซื้อเอกสารเปลี่ยนเป็น)			
ADDRESS (ที่อยู่)			
		COUNTRY :	
ATTN. (ผู้รับผิดชอบ)**:**		**FAX NO.:**	**TEL.:**
E-mail :			
LOCAL REPRESENTATIVE (ตัวแทนในประเทศ)			
ADDRESS (ที่อยู่)			
		TAX ID :	
ATTN. (ผู้รับผิดชอบ)**:**		**FAX NO.:**	**TEL.:**
E-mail :			

FOR PROCUREMENT OFFICER		**FOR PURCHASER**	
Procurement Officer (ผู้ส่งมอบเอกสาร)		**Document received by** (ผู้รับมอบเอกสาร)	

INVITATION TO BID NO. TS12-S-21 and TIPN-S-04 *(Revision 2)*

SUPPLY AND CONSTRUCTION OF 230/115 kV LAMPHUN 3 SUBSTATION (GIS), EXPANSION OF 115 kV CHOM THONG SUBSTATION, AND IMPROVEMENT OF 230 kV MAE MOH 3, 230 kV MAE MOH 4, 230 kV CHIANG MAI 3, 230 kV LAMPHUN 2 AND 115 kV HANG CHAT SUBSTATIONS

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

(TWO ENVELOPE)

The Electricity Generating Authority of Thailand (EGAT) is calling for the subject Invitation to Bid to be financed by EGAT's fund. The escalation factor (K) for price adjustment is applied to this Bid.

Place of Construction : Lamphun 3 Substation, Chom Thong Substation, Mae Moh 3 Substation, Mae Moh 4 Substation, Chiang Mai 3 Substation, Lamphun 2 Substation and Hang Chat Substation

Medium Cost (including Value Added Tax and other expenses) : THB 1,160,000,000.-

Eligibility of Bidders

1. **The Bidder and the Equipment shall be named in EGAT Accepted List as specified in the bidding documents.**
2. The Bidder shall be a juristic person who provides such services and shall not be named in the List of Work Abandoners published by the Office of Prime Minister and/or in the Debarment List and/or in the List of Work Abandoners declared by EGAT.
3. The Bidder shall not be a Jointly Interested Bidder with other Bidders as from the date of EGAT's issuance of the Invitation, or shall not be a person who undertakes any action as an "Obstruction of Fair Price Competition" for this Invitation.
4. The Bidder shall not either be EGAT's consultant or involve in EGAT's consultancy company under this Invitation to Bid, or shall not have EGAT's personnel involved in his business as shareholder having voting right that can control his business, director, manager, officer, employee, agent, or consultant except those who are officially ordered by EGAT to act or participate therein.
5. The Bidder shall not be the person who is privileged or protected not to be taken any legal proceedings under Thai Court; Provided that such Bidder's government declares that such special privilege is waived.
6. The Bidder who is a joint venture or consortium shall carry out all the work under such formation from the time of bidding until the fulfillment of the Contract.

Availability of Bidding Documents

Bidding Documents in CD-ROM will be available for examination of Bidder's Qualifications and purchase during 8:00 hrs. to 15:00 hrs., Bangkok Standard Time, as from November 19, 2019 to December 27, 2019 at USD 480.- or THB 15,000.- per copy, non-refundable, at the following address :

International Procurement Department - Transmission Segment
(Room No. 1202/2, 12th Floor, Building Tor. 101)
Procurement and Inventory Management Division
Electricity Generating Authority of Thailand
Bangkruai, Nonthaburi 11130, Thailand
Telephone no. 66 2436 0342
E-mail : procurement.tse@egat.co.th

Kannika Dhaelalupat

For more details and downloading Registration Form for purchasing Bidding Documents on website : http://www4.egat.co.th/fprocurement/biddingeng/

Payment can be made by a certified cheque or money order payable to EGAT or by a telegraphic transfer to EGAT's current account no. 109-6-01958-2 (swift code : KRTHTHBK), Krung Thai Bank Public Company Limited, Bangkruai Branch, Nonthaburi. All bank charges and fees incurred by the payment of bidding documents shall be under the buyer's responsibility.

Bidding Documents in CD-ROM will be either airmailed or airfreighted to the buyer at EGAT's expense upon receipt of the relevant remittance. In case the buyer requires the Bidding Documents to be sent by Express Mail Service (EMS), the charge will be at the buyer's expense.

* Delivery of Bids

Price and Technical Proposals shall be submitted at Room No. 1202/1, 12th Floor, Building Tor. 101 during 9:30 hrs. to 10:00 hrs., Bangkok Standard Time, ***February 19, 2020*** and Technical Proposal will be opened publicly at 10:00 hrs.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

February 7, 2020

Kannika Dhachalupat

(Mrs. Kannika Dhachalupat)

Chief, International Procurement Department - Transmission Segment

Remark : ** Price and Technical Proposals Submission Date and Technical Proposals Opening Date is postponed from January 28, 2020 to February 19, 2020.*

ประกาศการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ***(ฉบับแก้ไข ครั้งที่ 2)***

เรื่อง ประกวดราคาจ้าง เลขที่ TS12-S-21 and TIPN-S-04

(ประกวดราคา 2 ซอง)

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย (กฟผ.) มีความประสงค์จะจัดหาและจ้างก่อสร้างสถานีไฟฟ้าแรงสูง 230/115 kV ลำพูน 3 (GIS) จัดหาและจ้างก่อสร้างขยายสถานีไฟฟ้าแรงสูง 115 kV จอมทอง และจัดหาและจ้างปรับปรุงสถานีไฟฟ้าแรงสูง 230 kV แม่เมาะ 3 230 kV แม่เมาะ 4 230 kV เชียงใหม่ 3 230 kV ลำพูน 2 และ 115 kV ห้างฉัตร สำหรับโครงการขยายระบบส่งไฟฟ้าระยะที่ 12 และ โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคเหนือตอนบนเพื่อเสริมความมั่นคงระบบไฟฟ้า โดยทำสัญญาแบบปรับราคาได้ (ค่า k) โดยใช้งบประมาณ กฟผ.

สถานที่ก่อสร้าง : สถานีไฟฟ้าแรงสูงลำพูน 3 สถานีไฟฟ้าแรงสูงจอมทอง สถานีไฟฟ้าแรงสูงแม่เมาะ3 สถานีไฟฟ้าแรงสูงแม่เมาะ 4 สถานีไฟฟ้าแรงสูงเชียงใหม่ 3 สถานีไฟฟ้าแรงสูงลำพูน 2 และ สถานีไฟฟ้าแรงสูงห้างฉัตร

ราคากลาง (รวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ) : 1,160,000,000.- บาท

คุณสมบัติของผู้เสนอราคา

1. **ต้องเป็นผู้ประกอบการและพัสดุที่ผ่านการคัดเลือกคุณสมบัติเบื้องต้นตามบัญชีรายชื่อที่ระบุในเอกสารประกวดราคา**
2. ต้องเป็นนิติบุคคลผู้มีอาชีพรับจ้างตามประกวดราคาจ้างดังกล่าว และต้องไม่เป็นผู้ทิ้งงานซึ่งสำนักนายกรัฐมนตรีได้แจ้งเวียนชื่อไว้ หรือต้องไม่เป็นผู้ที่ กฟผ. ห้ามติดต่อหรือห้ามเข้าเสนอราคา หรือต้องไม่เป็นผู้ที่ได้รับผลของการสั่งให้นิติบุคคลหรือบุคคลอื่นเป็นผู้ทิ้งงานตามคำสั่ง กฟผ.
3. ต้องไม่เป็นผู้มีผลประโยชน์ร่วมกันกับผู้เสนอราคารายอื่น ณ วันประกาศประกวดราคาครั้งนี้เป็นต้นไป หรือต้องไม่เป็นผู้กระทำการอันเป็นการขัดขวางการแข่งขันราคาอย่างเป็นธรรมในการดำเนินการประกวดราคาครั้งนี้
4. ต้องไม่เป็นที่ปรึกษาของ กฟผ. หรือมีส่วนร่วมในบริษัทที่ปรึกษาของ กฟผ. ในงานนี้ หรือต้องไม่มีผู้ปฏิบัติงาน กฟผ. เข้าไปมีส่วนร่วมในกิจการของผู้เสนอราคา ไม่ว่าจะในฐานะผู้ถือหุ้นที่มีสิทธิควบคุมการจัดการ กรรมการ ผู้อำนวยการ ผู้จัดการ พนักงาน ลูกจ้าง ตัวแทน หรือที่ปรึกษา ยกเว้น ในกรณีที่ผู้ปฏิบัติงานได้รับคำสั่งอย่างเป็นทางการจาก กฟผ. ให้ไปปฏิบัติงานหรือเข้าร่วมในกิจการของผู้เสนอราคา
5. ต้องไม่เป็นผู้ได้รับเอกสิทธิ์หรือความคุ้มกัน ซึ่งอาจปฏิเสธไม่ยอมขึ้นศาลไทย เว้นแต่รัฐบาลของผู้เสนอราคาได้มีคำสั่งให้สละสิทธิ์และความคุ้มกันเช่นว่านั้น
6. ผู้ประสงค์เข้าประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม (Joint Venture or Consortium) จะต้องดำเนินการทุกขั้นตอนของการประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม ตั้งแต่การเสนอราคาจนสิ้นสุดข้อผูกพันกับ กฟผ.

<u>การขายเอกสารประกวดราคา</u>

ผู้สนใจติดต่อขอทราบรายละเอียด เพื่อตรวจสอบคุณสมบัติของผู้เสนอราคา และขอซื้อเอกสารประกวดราคา ในราคาชุดละ 15,000.- บาท ได้ที่ แผนกจัดจ้างต่างประเทศสายงานระบบส่ง (ห้อง 1202/2 ชั้น 12 อาคาร ท.101) กองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง ฝ่ายจัดซื้อจัดจ้างและบริหารพัสดุ การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เขิงสะพานพระราม 7 จังหวัดนนทบุรี ในวันทำการระหว่างเวลา 08:00 น. ถึง 15:00 น. ตั้งแต่วันที่ 19 พฤศจิกายน 2562 ถึงวันที่ 27 ธันวาคม 2562 หรือสอบถามทางโทรศัพท์ หมายเลข 0 2436 0342 หรืออีเมล์ procurement.tse@egat.co.th ทั้งนี้ สามารถ download แบบฟอร์มลงทะเบียนผู้ซื้อเอกสารประกวดราคาได้ที่เว็บไซต์ http://www4.egat.co.th/fprocurement/biddingeng/

* <u>การยื่นซองประกวดราคา</u>

กำหนดยื่นซองข้อเสนอด้านเทคนิคพร้อมซองราคา ในวันที่ ***19 กุมภาพันธ์ 2563*** เวลา 9:30 น. ถึง 10:00 น. และเปิดซองข้อเสนอด้านเทคนิคเวลา 10:00 น. ณ ห้อง 1202/1 ชั้น 12 อาคาร ท.101 การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เขิงสะพานพระราม 7 จังหวัดนนทบุรี

ประกาศแก้ไข ณ วันที่ 7 กุมภาพันธ์ 2563

กรรณิกา ธชาลุภัฏ

(นางกรรณิกา ธชาลุภัฏ)

หัวหน้ากองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง

หมายเหตุ : * เลื่อนกำหนดยื่นซองข้อเสนอด้านเทคนิคพร้อมซองราคาและเปิดซองข้อเสนอด้านเทคนิค จากวันที่ 28 มกราคม 2563 เป็นวันที่ 19 กุมภาพันธ์ 2563

ตารางแสดงวงเงินงบประมาณที่ได้รับจัดสรรและราคากลาง(ราคาอ้างอิง)
ในการจัดซื้อจัดจ้างที่มิใช่งานก่อสร้าง

1. **ชื่อโครงการ** ประกวดราคาเลขที่ TS12-S-21 and TIPN-S-04
งานจัดหาและจ้างก่อสร้างสถานีไฟฟ้าแรงสูง 230/115 kV ลำพูน 3 (GIS)
และจัดหาและจ้างก่อสร้างขยายสถานีไฟฟ้าแรงสูง 115 kV จอมทอง
และจัดหาและจ้างปรับปรุงสถานีไฟฟ้าแรงสูง 230 kV แม่เมาะ 3, 230 kV แม่เมาะ 4,
230 kV เชียงใหม่ 3, 230 kV ลำพูน 2 และ 115 kV ห้างฉัตร
โครงการขยายระบบส่งไฟฟ้าระยะที่ 12
โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคเหนือตอนบนเพื่อเสริมความมั่นคงระบบไฟฟ้า
/หน่วยงานเจ้าของโครงการ ฝ่ายแผนงานและโครงการระบบส่ง การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย

2. **วงเงินงบประมาณที่ได้รับจัดสรร**
โครงการขยายระบบส่งไฟฟ้าระยะที่ 12
งบประมาณ 60,000 ล้านบาท
โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคเหนือตอนบนเพื่อเสริมความมั่นคงระบบไฟฟ้า
งบประมาณ 12,240 ล้านบาท

3. **วันที่กำหนดราคากลาง** 20 สิงหาคม 2562 (วันที่ รวส. อนุมัติ)
ราคารวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ เป็นเงิน 1,160,000,000.00 บาท **ราคา/หน่วย** ตามเอกสารแนบ

4. **แหล่งที่มาของราคากลาง**
หลักเกณฑ์การกำหนดราคากลางการจัดซื้อและจัดจ้างงานก่อสร้างระบบส่งไฟฟ้าของสายงานระบบส่ง

5. **รายชื่อเจ้าหน้าที่ผู้กำหนดราคากลาง**

5.1 นายฉัตรชัย เชาวนาธิคม	หมฟ-ส. กวอ-ส.
5.2 นายธิติวัฒน์ เบญจวงศ์รัตน์	หสก-ส. กวอ-ส.
5.3 นายภานุวัฒน์ ลิขิตผลผดุง	หอต-ส. กวอ-ส.
5.4 นายสุริยะ ปรุงขวัญเมือง	หวอ-ส. กวอ-ส.
5.5 นายสุขสันต์ เขื่อนแก้ว	กวศ-ส.
5.6 นายเมธา รักบ่าน	กวป-ส.
5.7 นางรัมภา สุนทรินทุ	กวธ-ส.
5.8 นายเกรียงไกร ปิยะธำรงชัย	กรท-ส.
5.9 นางอุบลรัตน์ ต้นเกตุ	กวส-ส. อรส.

<u>หมายเหตุ</u> ค่าใช้จ่ายอื่นๆ ได้แก่ ค่าใช้จ่ายที่ กฟผ. ต้องจ่ายตามวิธีการพิจารณาเปรียบเทียบราคาที่กำหนดไว้ในเอกสารประกวดราคา เช่น อากรขาเข้า เป็นต้น

นางสาววัลลภา ชีวธนากรณ์กุล
หจตส-ห.
12 พ.ย. 2562

MEDIUM COST FOR BID NO. TS12-S-21 and TIPN-S-04

SUMMARY OF BID PRICE

SUPPLY AND CONSTRUCTION OF 230/115 kV LAMPHUN 3 SUBSTATION (GIS), EXPANSION OF 115 kV CHOM THONG SUBSTATION, AND IMPROVEMENT OF 230 kV MAE MOH 3, 230 kV MAE MOH 4, 230 kV CHIANG MAI 3, 230 kV LAMPHUN 2 AND 115 kV HANG CHAT SUBSTATIONS

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

Schedule	Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
			Foreign Supply	Local Supply			
			CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
			Amount	Amount	Amount	Amount	Amount
1	230 kV LAMPHUN 3 SUBSTATION (GIS)	THB	456,604,453.26	96,729,696.05	223,739,903.54	392,684.12	71,826,254.81
2	115 kV LAMPHUN 3 SUBSTATION (GIS)	THB	60,713,311.04	30,287,827.64	52,966,661.25	69,128.40	14,039,203.69
3	230 kV CHIANG MAI 3 SUBSTATION			5,312,534.00			1,654,491.00
4	230 kV LAMPHUN 2 SUBSTATION			1,404,494.00			859,138.00
5	230 kV MAE MOH 4 SUBSTATION			1,469,170.00			867,872.00

นางสาววัลลภา ชีวธนากรณ์กุล
หจตส-ห. 12 พ.ย. 2562

MEDIUM COST FOR BID NO. TS12-S-21 and TIPN-S-04

SUMMARY OF BID PRICE

SUPPLY AND CONSTRUCTION OF 230/115 kV LAMPHUN 3 SUBSTATION (GIS), EXPANSION OF 115 kV CHOM THONG SUBSTATION, AND IMPROVEMENT OF 230 kV MAE MOH 3, 230 kV MAE MOH 4, 230 kV CHIANG MAI 3, 230 kV LAMPHUN 2 AND 115 kV HANG CHAT SUBSTATIONS

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

Schedule	Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
			Foreign Supply	Local Supply			
			CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
			Amount	Amount	Amount	Amount	Amount
6	230 kV MAE MOH 3 SUBSTATION	THB	11,979.04	2,654,311.16			1,114,079.05
7	115 kV CHOM THONG SUBSTATION	THB	7,775,890.13	21,483,194.10	10,456,389.34	9,516.99	6,316,383.96
8	115 kV HANG CHAT SUBSTATION			915,072.00			710,382.60
BID PRICE		THB	525,105,633.47	Baht 160,256,298.95	Baht 287,162,954.13	Baht 471,329.51	Baht 97,387,805.11
OTHER EXPENSE		THB	10,502,112.66	Baht XXXXX	Baht XXXXX	Baht XXXXX	Baht XXXXX

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อวส.-อผค.

MEDIUM COST FOR BID NO. TS12-S-21 and TIPN-S-04

SUMMARY OF BID PRICE

SUPPLY AND CONSTRUCTION OF 230/115 kV LAMPHUN 3 SUBSTATION (GIS), EXPANSION OF 115 kV CHOM THONG SUBSTATION, AND IMPROVEMENT OF 230 kV MAE MOH 3, 230 kV MAE MOH 4, 230 kV CHIANG MAI 3, 230 kV LAMPHUN 2 AND 115 kV HANG CHAT SUBSTATIONS

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

Schedule	Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
			Foreign Supply	Local Supply			
			CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
			Amount	Amount	Amount	Amount	Amount
VAT		THB	37,492,542.23	Baht 11,217,940.93	Baht 20,101,406.79	Baht 32,993.07	Baht 6,817,146.36
SUMMARY OF BID PRICE		THB	573,100,288.36	Baht 171,474,239.88	Baht 307,264,360.92	Baht 504,322.58	Baht 104,204,951.47
TOTAL MEDIUM COST		THB	1,156,548,163.21				
TOTAL MEDIUM COST (ROUND)		THB	1,160,000,000.00				

Schedule 1, 3, 4, 5 and 6 are related schedules referring to Article F-15. Liquidated Damages for Late Completion and Late Delivery, item a. For Complete Construction of Substation.
Schedule 2, 7 and 8 are related schedules referring to Article F-15. Liquidated Damages for Late Completion and Late Delivery, item a. For Complete Construction of Substation.

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 1 : 230 KV LAMPHUN 3 SUBSTATION (GIS)
SUPPLY AND CONSTRUCTION OF 230 KV LAMPHUN 3 SUBSTATION (GIS)
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	451,528,311.46	93,951,925.05			71,826,254.81
PART 1C : CIVIL WORK				223,739,903.54		
PART 1D : SUPPLY OF SPARE PARTS	THB	5,076,141.80	2,777,771.00		392,684.12	
TOTAL PRICE	**THB**	**456,604,453.26**	**Baht 96,729,696.05**	**Baht 223,739,903.54**	**Baht 392,684.12**	**Baht 71,826,254.81**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

SUPPLY AND CONSTRUCTION OF 230 KV LAMPHUN 3 SUBSTATION (GIS)

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 1AB1 : Power Transformer and Marshalling Control Cubicle			156,000.00	15,600.00
Schedule 1AB2 : Distribution Transformer			2,507,000.00	250,700.00
Schedule 1AB4 : Surge Arrester	THB	4,068,000.00	864,000.00	493,200.00
Schedule 1AB5 : Current Transformer and Junction Box			110,000.00	11,000.00
Schedule 1AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	6,125,200.00	753,900.00	687,910.00
Schedule 1AB7 : SF6 Gas Insulated Switchgear	THB	424,952,808.00		42,495,280.80
Schedule 1AB11 : Power Fuse, Fuse Link and Hook Stick	THB	497,708.20		49,770.82
Schedule 1AB12 : AC&DC Distribution Board and Termination Box			3,071,339.00	307,133.90
Schedule 1AB13 : Stationary Battery and Battery Charger	THB	1,204,895.92	947,100.00	215,199.59
Schedule 1AB14 : Substation Steel Structure			11,545,969.50	2,886,492.38
Schedule 1AB15 : Insulator				246,945.60
Schedule 1AB16 : Cable Terminations	THB	96,834.43		24,208.61
Schedule 1AB17 : XLPE Power Cable			920,700.00	230,175.00
Schedule 1AB18 : Low Voltage Cable and Conductor			38,170,527.45	9,542,631.86
Schedule 1AB19 : Switchyard Lighting Fixtures			1,672,921.80	418,230.45
Schedule 1AB20 : Aluminum Tube, Connector and Miscellaneous Hardware			379,207.95	94,801.99
Schedule 1AB21 : Bus Fitting	THB	13,497,982.21		3,374,495.55
Schedule 1AB22 : Grounding Material	THB	976,624.00	1,397,231.00	593,463.75

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(นางสาววัลลภา สุภาวกุล)
อวส. ๔ ผค.๒

MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

SUPPLY AND CONSTRUCTION OF 230 KV LAMPHUN 3 SUBSTATION (GIS)

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 1AB23 : Substation Miscellaneous	THB	108,258.70	422,431.35	132,672.51
Schedule 1AB24 : Control and Protection System			23,706,716.00	2,370,666.00
Schedule 1AB25 : Fault Recording System			2,930,655.00	293,065.00
Schedule 1AB33 : CCTV			3,411,086.00	654,233.00
Schedule 1AB34 : 48 VDC Stationary Battery, Battery Charger and DC Power Panel			594,000.00	75,000.00
Schedule 1AB35 : Communication Cable			391,140.00	651,840.00
Schedule 1AB38 : Remote Terminal Unit				983,538.00
Schedule 1AB39 : Commissioning				4,728,000.00
PART 1AB	**THB**	**451,528,311.46**	**Baht 93,951,925.05**	**Baht 71,826,254.81**

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(นางสาวสมิตา สุภาวกุล)
อวส. ๑๐ ส.ค. ๖๒

MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 1C : CIVIL WORK

SUPPLY AND CONSTRUCTION OF 230 KV LAMPHUN 3 SUBSTATION (GIS)

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	**Local Currency** (excluding VAT) Baht
	Amount
Schedule 1C1 : Foundation Work	18,161,051.37
Schedule 1C2 : Cable Trench	8,296,598.50
Schedule 1C3 : Control Building	125,343,473.46
Schedule 1C4 : Earth Work, Road and Crushed Rock Surfacing	12,563,026.00
Schedule 1C5 : Water Supply System	1,445,429.66
Schedule 1C6 : Drainage System	17,231,596.43
Schedule 1C7 : Special Construction Works	3,520,480.57
Schedule 1C8 : Miscellaneous	5,133,287.34
Schedule 1C9 : Fire Protection System	32,044,960.21
PART 1C	**Baht** **223,739,903.54**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 1D : SUPPLY OF SPARE PARTS

SUPPLY AND CONSTRUCTION OF 230 KV LAMPHUN 3 SUBSTATION (GIS)

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount
Schedule 1D7 : Spare Parts for SF6 Gas Insulated Switchgear	THB	5,021,210.00		251,060.50
Schedule 1D11 : Spare Parts for Power Fuse, Fuse Link and Hook Stick	THB	54,931.80		2,746.62
Schedule 1D24 : Spare Parts for Control and Protection System			2,357,248.00	117,856.00
Schedule 1D25 : Spare Parts for Fault Recording System			420,523.00	21,021.00
PART 1D	**THB**	**5,076,141.80**	**Baht 2,777,771.00**	**Baht 392,684.12**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 2 : 115 KV LAMPHUN 3 SUBSTATION (GIS)
SUPPLY AND CONSTRUCTION OF 115 KV LAMPHUN 3 SUBSTATION (GIS)
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	60,155,503.04	29,463,022.64			14,039,203.69
PART 2C : CIVIL WORK				52,966,661.25		
PART 2D : SUPPLY OF SPARE PARTS	THB	557,808.00	824,805.00		69,128.40	
TOTAL PRICE	**THB**	**60,713,311.04**	**Baht 30,287,827.64**	**Baht 52,966,661.25**	**Baht 69,128.40**	**Baht 14,039,203.69**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV LAMPHUN 3 SUBSTATION (GIS)
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 2AB4 : Surge Arrester	THB	972,000.00	558,000.00	153,000.00
Schedule 2AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	2,052,000.00	284,900.00	233,690.00
Schedule 2AB7 : SF6 Gas Insulated Switchgear	THB	56,556,003.00		5,655,600.30
Schedule 2AB12 : AC&DC Distribution Board and Termination Box			428,712.00	42,871.20
Schedule 2AB14 : Substation Steel Structure			1,745,599.74	436,399.94
Schedule 2AB15 : Insulator				153,241.00
Schedule 2AB18 : Low Voltage Cable and Conductor			12,767,330.40	3,191,832.60
Schedule 2AB19 : Switchyard Lighting Fixtures			808,080.90	202,020.23
Schedule 2AB20 : Aluminum Tube, Connector and Miscellaneous Hardware			87,634.80	21,908.70
Schedule 2AB21 : Bus Fitting	THB	118,591.94		29,647.99
Schedule 2AB22 : Grounding Material	THB	431,871.00	62,502.00	123,593.25
Schedule 2AB23 : Substation Miscellaneous	THB	25,037.10	123,824.80	37,215.48
Schedule 2AB24 : Control and Protection System			10,524,353.00	1,052,432.00
Schedule 2AB25 : Fault Recording System			1,809,065.00	180,906.00
Schedule 2AB35 : Communication Cable			263,020.00	436,360.00
Schedule 2AB38 : Remote Terminal Unit				388,485.00
Schedule 2AB39 : Commissioning				1,700,000.00
PART 2AB	**THB**	**60,155,503.04**	**Baht 29,463,022.64**	**Baht 14,039,203.69**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 2C : CIVIL WORK

SUPPLY AND CONSTRUCTION OF 115 KV LAMPHUN 3 SUBSTATION (GIS)

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	**Local Currency** (excluding VAT) Baht
	Amount
Schedule 2C1 : Foundation Work	2,216,394.68
Schedule 2C2 : Cable Trench	4,415,707.50
Schedule 2C3 : Control Building	33,274,277.44
Schedule 2C4 : Earth Work, Road and Crushed Rock Surfacing	2,933,850.00
Schedule 2C5 : Water Supply System	22,808.00
Schedule 2C6 : Drainage System	4,770,521.00
Schedule 2C7 : Special Construction Works	438,822.95
Schedule 2C8 : Miscellaneous	1,231,219.72
Schedule 2C9 : Fire Protection System	3,663,059.96
PART 2C	**Baht** **52,966,661.25**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 2D : SUPPLY OF SPARE PARTS

SUPPLY AND CONSTRUCTION OF 115 KV LAMPHUN 3 SUBSTATION (GIS)

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount
Schedule 2D7 : Spare Parts for SF6 Gas Insulated Switchgear	THB	557,808.00 ✓		27,890.40
Schedule 2D24 : Spare Parts for Control and Protection System			824,805.00 ✓	41,238.00 ✓
PART 2D	**THB**	**557,808.00**	**Baht 824,805.00**	**Baht 69,128.40**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 3 : 230 KV CHIANG MAI 3 SUBSTATION
IMPROVEMENT OF 230 KV CHIANG MAI 3 SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 3AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT			5,312,534.00			1,654,491.00
TOTAL PRICE			**Baht** **5,312,534.00**	**Baht**	**Baht**	**Baht** **1,654,491.00**

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(นางสาววิทมา จุฑาวกุล)
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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 3AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

IMPROVEMENT OF 230 KV CHIANG MAI 3 SUBSTATION

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 3AB18 : Low Voltage Cable and Conductor			3,203,860.00	800,965.00
Schedule 3AB24 : Control and Protection System			2,108,674.00	235,618.00
Schedule 3AB25 : Fault Recording System				27,868.00
Schedule 3AB38 : Remote Terminal Unit				32,040.00
Schedule 3AB39 : Commissioning				558,000.00
PART 3AB			**Baht 5,312,534.00**	**Baht 1,654,491.00**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 4 : 230 KV LAMPHUN 2 SUBSTATION
IMPROVEMENT OF 230 KV LAMPHUN 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 4AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT			1,404,494.00			859,138.00
TOTAL PRICE			**Baht 1,404,494.00**	**Baht**	**Baht**	**Baht 859,138.00**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 4AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

IMPROVEMENT OF 230 KV LAMPHUN 2 SUBSTATION

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	**Supply of Equipment**		**Local Transportation, Construction and Installation** (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 4AB18 : Low Voltage Cable and Conductor			477,620.00	119,405.00
Schedule 4AB24 : Control and Protection System			926,874.00	121,825.00
Schedule 4AB25 : Fault Recording System				27,868.00
Schedule 4AB38 : Remote Terminal Unit				32,040.00
Schedule 4AB39 : Commissioning				558,000.00
PART 4AB			**Baht** **1,404,494.00**	**Baht** **859,138.00**

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(นางสาวพนา ยุกาวกุล) อวส. 10 พ.ย. 62

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 5 : 230 KV MAE MOH 4 SUBSTATION
IMPROVEMENT OF 230 KV MAE MOH 4 SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 5AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT			1,469,170.00			867,872.00
TOTAL PRICE			**Baht 1,469,170.00**	**Baht**	**Baht**	**Baht 867,872.00**

นางสาววัลลภา ชีวธนากรณ์กุล
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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 5AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

IMPROVEMENT OF 230 KV MAE MOH 4 SUBSTATION

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	**Supply of Equipment**		**Local Transportation, Construction and Installation** (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 5AB18 : Low Voltage Cable and Conductor			533,060.00	133,265.00
Schedule 5AB24 : Control and Protection System			936,110.00	116,699.00
Schedule 5AB25 : Fault Recording System				27,868.00
Schedule 5AB38 : Remote Terminal Unit				32,040.00
Schedule 5AB39 : Commissioning				558,000.00
PART 5AB			**Baht 1,469,170.00**	**Baht 867,872.00**

นางสาววัลลภา ชีวธนากรณ์กุล
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(นางสาววัลลภา ชีวธนากรณ์กุล)
อวส. 12 พ.ย. 62

MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 6 : 230 KV MAE MOH 3 SUBSTATION
IMPROVEMENT OF 230 KV MAE MOH 3 SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 6AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	11,979.04	2,654,311.16			1,114,079.05
TOTAL PRICE	**THB**	**11,979.04**	**Baht 2,654,311.16**	**Baht**	**Baht**	**Baht 1,114,079.05**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 6AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

IMPROVEMENT OF 230 KV MAE MOH 3 SUBSTATION

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 6AB18 : Low Voltage Cable and Conductor	THB	11,979.04	1,211,621.40	302,905.35
Schedule 6AB20 : Aluminum Tube, Connector and Miscellaneous Hardware			19,031.76	4,757.94
Schedule 6AB21 : Bus Fitting				2,994.76
Schedule 6AB24 : Control and Protection System			1,423,658.00	167,513.00
Schedule 6AB25 : Fault Recording System				27,868.00
Schedule 6AB38 : Remote Terminal Unit				32,040.00
Schedule 6AB39 : Commissioning				558,000.00
Schedule 6AB40 : Installation of Equipment and Steel Structure Supplied by EGAT				18,000.00
PART 6AB	**THB**	**11,979.04**	**Baht 2,654,311.16**	**Baht 1,114,079.05**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 7 : 115 KV CHOM THONG SUBSTATION
EXPANSION OF 115 KV CHOM THONG SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 7AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	7,585,550.53	21,483,194.10			6,316,383.96
PART 7C : CIVIL WORK				10,456,389.34		
PART 7D : SUPPLY OF SPARE PARTS	THB	190,339.60			9,516.99	
TOTAL PRICE	**THB**	**7,775,890.13**	**Baht 21,483,194.10**	**Baht 10,456,389.34**	**Baht 9,516.99**	**Baht 6,316,383.96**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 7AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

EXPANSION OF 115 KV CHOM THONG SUBSTATION

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 7AB5 : Current Transformer and Junction Box	THB	2,910,000.00	350,000.00	391,200.00
Schedule 7AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	722,000.00	157,750.00	105,570.00
Schedule 7AB9 : Power Circuit Breaker	THB	1,722,600.00	86,750.40	217,122.05
Schedule 7AB10 : Disconnecting Switch	THB	1,663,200.00	532,540.80	263,488.90
Schedule 7AB12 : AC&DC Distribution Board and Termination Box			279,374.00	33,524.88
Schedule 7AB14 : Substation Steel Structure			865,627.42	259,688.23
Schedule 7AB15 : Insulator				60,589.65
Schedule 7AB18 : Low Voltage Cable and Conductor			6,853,193.16	1,713,298.29
Schedule 7AB19 : Switchyard Lighting Fixtures			56,760.00	17,028.00
Schedule 7AB20 : Aluminum Tube, Connector and Miscellaneous Hardware			258,431.76	64,607.94
Schedule 7AB21 : Bus Fitting	THB	320,641.25		80,160.31
Schedule 7AB22 : Grounding Material	THB	122,036.64	299,914.56	105,487.80
Schedule 7AB23 : Substation Miscellaneous	THB	125,072.64	222,387.00	86,864.91
Schedule 7AB24 : Control and Protection System			9,256,338.00	1,016,288.00
Schedule 7AB25 : Fault Recording System			2,264,127.00	226,412.00

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 7AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

EXPANSION OF 115 KV CHOM THONG SUBSTATION

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 7AB38 : Remote Terminal Unit				595,053.00
Schedule 7AB39 : Commissioning				972,000.00
Schedule 7AB40 : Installation of Equipment and Steel Structure Supplied by				108,000.00
PART 7AB	**THB**	**7,585,550.53**	**Baht 21,483,194.10**	**Baht 6,316,383.96**

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(นางสาวพิมา สุภาวกุล)
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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
PART 7C : CIVIL WORK
EXPANSION OF 115 KV CHOM THONG SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Local Currency (excluding VAT) Baht
	Amount
Schedule 7C1 : Foundation Work	1,213,051.00
Schedule 7C2 : Cable Trench	471,828.00
Schedule 7C3 : Control Building	2,831,136.00
Schedule 7C7 : Special Construction Works	771,299.34
Schedule 7C9 : Fire Protection System	5,169,075.00
PART 7C	**Baht 10,456,389.34**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
PART 7D : SUPPLY OF SPARE PARTS
EXPANSION OF 115 KV CHOM THONG SUBSTATION
TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

Description	Currency	Supply of Equipment		Local Transportation
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount
Schedule 7D9 : Spare Parts for Power Circuit Breaker	THB	190,339.60		9,516.99
PART 7D	**THB**	**190,339.60**	**Baht**	**Baht** **9,516.99**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04
SCHEDULE 8 : 115 KV HANG CHAT SUBSTATION
IMPROVEMENT OF 115 KV HANG CHAT SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Currency	Local Transportation	Local Transportation, Construction and Installation
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount	Amount	Amount
PART 8AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT			915,072.00			710,382.60
TOTAL PRICE			**Baht 915,072.00**	**Baht**	**Baht**	**Baht 710,382.60**

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MEDIUM COST FOR BID NO.TS12-S-21 AND TIPN-S-04

PART 8AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

IMPROVEMENT OF 115 KV HANG CHAT SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	Amount
Schedule 8AB18 : Low Voltage Cable and Conductor			260,370.00	65,092.50
Schedule 8AB24 : Control and Protection System			654,702.00	99,382.10
Schedule 8AB25 : Fault Recording System				27,868.00
Schedule 8AB38 : Remote Terminal Unit				32,040.00
Schedule 8AB39 : Commissioning				486,000.00
PART 8AB			**Baht 915,072.00**	**Baht 710,382.60**

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หจตส-ห
12 พ.ย. 2562

Important Information

for

Invitation to Bid No. TS12-S-21 and TIPN-S-04

The purpose of this section is to inform the Bidders to **carefully study** the details of the revised terms and conditions in the bidding documents. The following provisions have been **recently revised** as stated hereunder:

Article A-4. Eligibility of Bidders: Technical Requirements

The Bidder shall be named in EGAT Accepted Bidders List for Supply and Construction of Substations attached at the end of Section A. Invitation to Bid.

Some of the Equipment to be proposed by the Bidder shall be only those specified in EGAT Accepted List for such Equipment as attached at the end of Section A. Invitation to Bid. The Bidder shall carefully study Article A-4. Eligibility of Bidders: Technical Requirements and make sure to propose Equipment correctly.

Article F-11. Payment:

If the Contractor requires the payment of foreign currency portion to be paid directly to the suppliers, he has to inform EGAT **which portion of the Contract Price, as stipulated in the term of payment of the Contract**, to be paid accordingly.

In case the local Contractor requires foreign currency or currencies to be paid directly to him, payment of such foreign currency or currencies will be made to the local Contractor in Thai Baht by using the **selling exchange rate** published by the Bank of Thailand on the **payment date** (previously stated as buying exchange rate on the bid opening date).

The number of days which payment for the first portion of foreign supply will be made after delivery, previously specified as 45 days, has been **deleted**.

Article F-15. Liquidated Damages for Late Completion and Late Delivery:

The limit of liquidated damages, previously specified that does not exceed 10%, has been **deleted**.

DATA SHEET

for

Invitation to Bid No. TS12-S-21 and TIPN-S-04

(Two-envelope)

This Section consists of provisions that are specific to each procurement and supplement the information or requirements included in Bidding Documents.

Article B-3. Bid Security

The amount of bid security shall be USD 1,870,380.- or THB 58,000,000.-.

Article B-4. Validity of Bids

The validity of the bid shall be for two hundred and seventy (270) Days from the date specified for opening of technical proposals.

Article F-15. Liquidated Damages for Late Completion and Late Delivery,
item a. For Complete Construction of Substation,

1. If the Contractor fails to meet any of the completion dates for Schedule No. 1 : 230 kV Lamphun 3 Substation (GIS) or Schedule No. 3 : 230 kV Chiang Mai 3 Substation or Schedule No. 4 : 230 kV Lamphun 2 Substation or Schedule No. 5 : 230 kV Mae Moh 4 Substation or Schedule No. 6 : 230 kV Mae Moh 3 Substation, the liquidated damages shall be at the rate of one-tenth of one (0.10) per cent of the total Contract Price for Schedule No. 1 : 230 kV Lamphun 3 Substation (GIS) and Schedule No. 3 : 230 kV Chiang Mai 3 Substation and Schedule No. 4 : 230 kV Lamphun 2 Substation and Schedule No. 5 : 230 kV Mae Moh 4 Substation and Schedule No. 6 : 230 kV Mae Moh 3 Substation for each Day of delay. This sum is payable regardless of the actual loss and/or damages incurred.

2. If the Contractor fails to meet any of the completion dates for Schedule No. 2 : 115 kV Lamphun 3 Substation (GIS) or Schedule No. 7 : 115 kV Chom Thong Substation or Schedule No. 8 : 115 kV Hang Chat Substation, the liquidated damages shall be at the rate of one-tenth of one (0.10) per cent of the total Contract Price for Schedule No. 2 : 115 kV Lamphun 3 Substation (GIS) and Schedule No. 7 : 115 kV Chom Thong Substation and Schedule No. 8 : 115 kV Hang Chat Substation for each Day of delay. This sum is payable regardless of the actual loss and/or damages incurred.

Maintenance Guarantee Period

- For all Work except 500 kV System

  The Contractor shall guarantee the proper functioning of the Work for a period of one (1) Year except the following Equipment the guarantee period of which shall be as follows :

Equipment	Period of Guarantee (Year)
- Fault Recording System	2
- Control and Protection System	2

- For 500 kV System

  The Contractor shall guarantee the proper functioning of the Work for a period of five (5) Years.

Defective Equipment to be replaced with the whole new set

Not Applicable

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ELECTRICITY GENERATING AUTHORITY OF THAILAND

Nonthaburi
Thailand

INVITATION TO BID NO. TS12-S-21 and TIPN-S-04

**SUPPLY AND CONSTRUCTION OF
230/115 kV LAMPHUN 3 SUBSTATION (GIS),
EXPANSION OF 115 kV CHOM THONG SUBSTATION,
AND IMPROVEMENT OF 230 kV MAE MOH 3,
230 kV MAE MOH 4, 230 kV CHIANG MAI 3,
230 kV LAMPHUN 2 AND 115 kV HANG CHAT SUBSTATIONS**

TRANSMISSION SYSTEM EXPANSION PROJECT NO. 12

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN UPPER NORTHERN REGION TO ENHANCE SYSTEM SECURITY

Invitation

The Electricity Generating Authority of Thailand (EGAT) hereby invites sealed bids for supply and construction of 230/115 kV Lamphun 3 Substation (GIS), Expansion of 115 kV Chom Thong Substation, and Improvement of 230 kV Mae Moh 3, 230 kV Mae Moh 4, 230 kV Chiang Mai 3, 230 kV Lamphun 2 and 115 kV Hang Chat Substations under Transmission System Expansion Project No.12 and Transmission System Improvement Project in Upper Northern Region to Enhance System Security as described herein in accordance with terms, conditions and Specifications described in these Bidding Documents.

Work Description

The supply and construction of 230/115 kV Lamphun 3 Substation (GIS), Expansion of 115 kV Chom Thong Substation, and Improvement of 230 kV Mae Moh 3, 230 kV Mae Moh 4, 230 kV Chiang Mai 3, 230 kV Lamphun 2 and 115 kV Hang Chat Substations will be on a supply and construction basis, the Contractor shall be responsible for complete supply, installation, construction and also engineering design work to the standard specified and best modern practice. The substations to be constructed and the scope of work under this Invitation are described in Section H. Scope of Work.

Eligibility of Bidders: General Requirements

I. All Bidders shall meet the following requirements; failure to so comply shall constitute sufficient ground for rejection.

a. The Bidder shall be a partnership, firm or company, either alone or in joint venture or in consortium.

b. The Bidder shall be well-established and maintain a permanent place of business.

c. The Bidder shall not be, or supply the Equipment, from the country under the state of Civil War.

d. The Bidder shall be a juristic person who manufactures or provides such material or services, as the case may be, and not be named in the List of Work Abandoners published by the Office of Prime Minister and/or in the Debarment List and/or in the List of Work Abandoners declared by EGAT.

e. The Bidder shall not be a Jointly Interested Bidder with other Bidders as from the date of EGAT's issuance of the Invitation to Bid, or shall not be a person who undertakes any action as an "Obstruction of Fair Price Competition" as defined in Additional Regulation for this Invitation.

f. The Bidder shall not either be EGAT's consultant or involving in EGAT's consultancy company under this Invitation, or have EGAT's personnel involved in his business as shareholder having voting right that can control his business, director, manager, officer, employee, agent or consultant except for the ones who are officially ordered by EGAT to act or participate therein.

g. The Bidder shall not be the person who is privileged or protected not to be taken any legal proceeding under Thai Court; provided that such Bidder's government declares that such special privilege is waived.

h. In case of a joint venture or consortium, the Bidder shall carry out all the work under such formation from the time of bidding until the fulfillment of the Contract.

i. ***The Bidder shall be a purchaser of the bidding documents from EGAT. For a joint venture or consortium, only one (1) member of the joint venture or consortium is required to purchase the bidding documents.***

In the case where the Bidder is not the purchaser of the bidding documents, the purchaser shall notify EGAT of the name of the Bidder in writing prior to the bid opening.

II. All Bidders should preferably meet the following requirements; failure to so comply may constitute sufficient ground for rejection.

a. The Bidder shall have adequate fund to meet financial obligations incidental to this Contract.

b. The Bidder shall supply documentary evidence established in accordance with Article B-8. Information to be Submitted with Bid to demonstrate adequately that he is eligible to bid and is qualified to perform the Contract if his bid is accepted. Bidder should also demonstrate his capacity to perform the Work either with or without the use of subcontractor.

Eligibility of Bidders: Technical Requirements

I. All Bidders shall meet the following requirements; failure to so comply shall constitute sufficient ground for rejection.

a. Being well-established and maintaining a permanent place of business.

If the Bidder is a new company formed by acquisition of or merger with other companies or business units before submitting the Bid, the experience records of any of such previous companies or business units that meet the requirements set forth herein are acceptable as the experience records of the Bidder.

If Bidder is a new company formed by acquisition of or merger with other companies or business units, the pending claim of any of such previous companies or business units shall be considered pending claim of the Bidder.

Reference records of either the parent or affiliated companies shall not be considered as the record of such Bidder.

b. The Bidder shall be named in EGAT Accepted Bidders List for Supply and Construction of Substations attached at the end of Section A. Invitation to Bid.

c. The Bidder shall propose Equipment manufactured by the qualified manufacturers who shall fulfill the following requirements:

1. Regularly manufacturing of Equipment of the type and similar ratings proposed.

2. Being well-established and maintaining a permanent place of business.

3. The manufacturer shall have the experience records that meet the requirements set forth herein.

Reference records of either parent or affiliated companies shall not be considered as the records of such manufacturer.

4. If the Manufacturer is a new company formed by acquisition of or merger with other companies or business units, and any of such previous companies or business units has the experience records that meet the requirements set forth herein, such experience records are acceptable as the experience records of the new company, provided that each item of the equipment to be supplied under this bid shall be manufactured from the same source of supply as indicated in each of such relevant supply records as described in Item I.c.6 below. Otherwise, it shall not be acceptable and shall be sufficient grounds for rejection.

   For the avoidance of doubt, it is not allowed to combine the experience records of the previous companies or business units in order to meet the experience requirements.

5. For Equipment, having the same ratings as specified in EGAT Accepted List at the end of Section A. Invitation to Bid, shall have the following qualifications:

   5.1 These Equipment shall be named in the EGAT Accepted List.

   5.2 Having a past design test record of the Equipment as proposed, if specified in EGAT's specification. Such past design test record shall conform to the test specified in EGAT's specification (if required).

6. For Equipment not having the same ratings as specified in EGAT Accepted List at the end of Section A. Invitation to Bid:

   6.1 For 230/115 kV Ratings of Gas-Insulated Switchgear (GIS). These Equipment shall be manufactured by the qualified manufacturers who shall fulfill the following requirements:

      6.1.1 Having one of the following qualifications:

         6.1.1.1 Proposing the Equipment of the type and ratings which has already been accepted by EGAT.

         OR

         6.1.1.2 For 230 kV Gas-Insulated Switchgear (GIS):

            Having a supply record of Equipment of the type proposed ***(type of enclosure, interrupter of circuit breaker, rated filling gas pressure)*** at the nominal system voltage of 220 kV or above, 3000 A or above, 50 kA or above, with successful operation/use of at least three (3) consecutive years in overseas country (not his own country) and at least three (3) substations of which total GIS bays shall not be less than twelve (12).

However, the Equipment of the type and short circuit current ratings proposed shall have a supply record of successful operation/use of at least three (3) consecutive years in overseas country (not his own country) and at least one (1) substation of which total GIS bays shall not be less than four (4).

In case that the supply record of Equipment of the type and ratings proposed fulfills the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use of at least three (3) substations of which total GIS bays shall not be less than twelve (12) and having minimum one (1) year in overseas country (not his own country). The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

For 115 kV Gas-Insulated Switchgear (GIS):

Having a supply record of Equipment of the type proposed ***(type of enclosure, interrupter of circuit breaker, rated filling gas pressure)*** at the nominal system voltage of 110 kV or above, 2000 A or above, 40 kA or above, with successful operation/use of at least three (3) consecutive years in overseas country (not his own country) and at least three (3) substations of which total GIS bays shall not be less than twelve (12).

However, the Equipment of the type and short circuit current ratings proposed shall have a supply record of successful operation/use of at least three (3) consecutive years in overseas country (not his own country) and at least one (1) substation of which total GIS bays shall not be less than four (4).

In case that the supply record of Equipment of the type and ratings proposed fulfills the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use of at least three (3) substations of which total GIS bays shall not be less than twelve (12) and having minimum one (1) year in overseas country (not his own country). The detailed information of the development or modification shall be submitted with his proposal. EGAT, however,

reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

6.1.2 Having a past design test record of the Equipment as proposed, if specified in EGAT's specification. Such past design test record shall conform to the test specified in EGAT's specification.

6.2 For 230 kV Control and Protection System and below, having the following qualifications:

6.2.1 Being local manufacturer.

6.2.2 Having one of the following qualifications:

6.2.2.1 Having at least three (3) consecutive years' supply record of successful operation/use in 220 kV or above Transmission System of at least three (3) units of each type of Protective Relay Panels of which the characteristics are similar to the ones specified herein to EGAT or other Electricity Authorities of Thailand

OR

6.2.2.2 Having a letter of acceptance for manufacturing and/or fabrication of the specific Equipment issued by EGAT within the scope specified therein.

II. All Bidders should preferably meet the following technical requirements; failure to so comply may constitute sufficient ground for rejection.

a. The Bidder shall have sufficient capacity to carry out the work.

b. The Bidder shall have no just or proper claims pending against him with respect to breach in the performance of Contract on other similar works awarded by EGAT. In case the Bidder is a joint venture/consortium, either member of the joint venture/consortium shall have no just or proper claims pending against him with respect to breach in the performance of Contract on other similar works awarded by EGAT.

c. The Bidder himself or his subcontractors, at the time of submitting this proposal, shall not carry excessive work nor be in a default position with respect to work with EGAT. Unsatisfactory past performance on Contract awarded by EGAT may be a sufficient reason of being disqualified.

d. The Bidder shall propose Equipment from manufacturers who fulfill the requirements below. If there is any deficiency, EGAT reserves the right to require the Bidder to propose new manufacturer or new type/model of Equipment without any additional cost to EGAT.

1. Regularly manufacturing of Equipment of the type and similar ratings proposed.

2. Being well-established and maintaining a permanent place of business

3. The manufacturer shall have the experience records that meet the requirements set forth herein.

   Reference records of either parent or affiliated companies shall not be considered as the records of such manufacturer.

4. If the Manufacturer is a new company formed by acquisition of or merger with other companies or business units, and any of such previous companies or business units has the experience records that meet the requirements set forth herein, such experience records are acceptable as the experience records of the new company, provided that each item of the equipment to be supplied under this bid shall be manufactured from the same source of supply as indicated in each of such relevant supply records as described in Item II.d.6 below.

   For the avoidance of doubt, it is not allowed to combine the experience records of the previous companies or business units in order to meet the experience requirements.

5. For Equipment, having the same ratings as specified in EGAT Accepted List at the end of Section A. Invitation to Bid, shall have the following qualifications:

   5.1 These Equipment shall be named in the EGAT Accepted List.

   5.2 Having a past design test record of the Equipment as proposed, if specified in EGAT's specification. Such past design test record shall conform to the test specified in EGAT's specification (if required).

6. For Equipment not having the same ratings as specified in EGAT Accepted List at the end of Section A. Invitation to Bid:

   6.1 For 230/115 kV Ratings of Power Circuit Breaker shall be manufactured by the qualified manufacturers who shall fulfill the following requirements:

      6.1.1 Having one of the following qualifications:

         6.1.1.1 Proposing the Equipment of the type and ratings which has already been accepted by EGAT.

         OR

         6.1.1.2 For 230 kV Power Circuit Breaker:

Having a supply record of Equipment of the type proposed at nominal system voltage of 220 kV or above, 3000 A or above, 50 kA or above, with successful operation/use of at least three (3) consecutive years in an overseas country (not his own country) and at least three (3) three phase sets.

However, the Equipment of the type and short circuit current ratings proposed shall have a supply record of successful operation/use of at least three (3) consecutive years in overseas country (not his own country) and at least one (1) three phase set.

In case that the supply record of Equipment of the type and ratings proposed fulfilled the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use of at least one (1) year in overseas country (not his own country) and at least three (3) three phase sets. The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

For 115 kV Power Circuit Breaker:

Having a supply record of Equipment of the type proposed at nominal system voltage of 110 kV or above, 2000 A or above, 40 kA or above, with successful operation/use of at least three (3) consecutive years in an overseas country (not his own country) and at least three (3) three phase sets.

However, the Equipment of the type and short circuit current ratings proposed shall have a supply record of successful operation/use of at least three (3) consecutive years in overseas country (not his own country) and at least one (1) three phase set.

In case that the supply record of Equipment of the type and ratings proposed fulfilled the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use for at least one (1) year in overseas country (not his own country) and at least three (3) three phase sets. The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

6.1.2 Having a past design test record of the Equipment as proposed, if specified in EGAT's specification. Such past design test record shall conform to the test specified in EGAT's specification.

6.2 For 230/115 kV Ratings of following Equipment: Instrument Transformer, Surge Arrester and Disconnecting Switch. These Equipment shall be manufactured by the qualified manufacturers who shall fulfill the following requirements:

6.2.1 Having one of the following qualifications:

6.2.1.1 Proposing the Equipment of the type and ratings which has already been accepted by EGAT.

OR

6.2.1.2 Having a supply record of Equipment of the type and ratings proposed with successful operation/use of at least three (3) three-phase sets and having minimum three (3) consecutive years in an overseas country (not his own country).

In case that the supply record of Equipment of the type and ratings proposed fulfills the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use of at least three (3) three-phase sets and having minimum one (1) year in overseas country (not his own country). The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

Supply records of the higher rating Equipment shall not be considered if the Bidder does not propose such higher rating Equipment in his bid.

6.2.2 Having a past design test record of the Equipment as proposed, if specified in EGAT's specification. Such past design test record shall conform to the test specified in EGAT's specification.

6.3 For 33, 22 and 11 kV ratings of following Equipment : Metal-Clad SF_6 Gas Insulated Switchgear, Power Circuit Breaker, Instrument Transformer, Disconnecting Switch and Surge Arrester:

Having one of the following qualifications:

6.3.1 Proposing the Equipment of the type and ratings which has already been accepted by EGAT.

OR

6.3.2 Having a supply record of Equipment of the type and ratings proposed with successful operation/use of at least three (3) consecutive years in an overseas country (not his own country) and at least three (3) three phase sets. The ratings and features of Equipment shall be the same or similar rating as EGAT specifies.

In case that the supply record of Equipment of the type and ratings proposed fulfilled the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use of at least one (1) year in overseas country (not his own country) and at least three (3) three phase sets. The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

Supply records of the higher rating Equipment shall not be considered if the Bidder does not propose such higher rating Equipment in his bid.

6.4 For Distribution Transformer, Power Fuse, AC&DC Distribution Board and Lighting Relay Panel (LRP), Load Center Unit Substation (LCUS), Junction Box, Battery Charger, Substation Steel Structure, 33 kV and below Cable Terminations, 115 kV and below XLPE Power Cable, Power Cable, Control Cable and Switchboard Wire, Lighting Cable, Copper Ground Wire, Overhead Ground Wire, Aluminum Conductor, Optical Fiber Cable, Switchyard Lighting Fixtures, Aluminum Tube, Compression Connector and Miscellaneous Hardware, Bus Fittings, Ground Rod, Thermite Welding Material, Grounding Hardware, Conduit and Conduit Fittings:

6.4.1 Being local manufacturer for the following Equipment:

Distribution Transformer, AC&DC Distribution Board and Lighting Relay Panel (LRP), Load Center Unit Substation (LCUS), Junction Box, Battery Charger, Substation Steel Structure, 115 kV and below XLPE Power Cable, Power Cable, Control Cable and Switchboard Wire, Lighting Cable, Copper Ground Wire, Overhead Ground Wire, Aluminum Conductor, Single mode optical fiber cable, Switchyard Lighting Fixtures, Aluminum Tube, Compression Connector and Miscellaneous Hardware, Thermite Welding Material and Conduit.

6.4.2 Having been granted a licence for producing standard product by Thai Industrial Standard Institute (TISI), Ministry of Industry for the following Equipment:

60 kV through 115 kV XLPE Power Cable, Lighting cable and Aluminum conductor.

6.4.3 Having one of the following qualifications:

6.4.3.1 Having supply record of Equipment of the type and similar ratings proposed with successful operation/use for at least one (1) year.

OR

6.4.3.2 Having a letter of acceptance for manufacturing and/or fabrication of the specific Equipment issued by EGAT within the scope specified therein (For the local manufacturer).

6.5 For Insulator:

Having one of the following qualifications:

6.5.1 Having supply record with successful operation/use for at least three (3) consecutive years in overseas country (not his own country) and for following equipment:

6.5.1.1 Suspension Insulator, at least 10,000 units having the similar ANSI class as proposed.

6.5.1.2 Station Post Insulator, having the similar ANSI technical reference number as proposed.

OR

6.5.2 Having a letter of acceptance for manufacturing and/or fabrication of the specific Equipment issued by EGAT within the scope specified therein (For the local manufacturer).

6.6 For Stationary Battery:

Having one of the following qualifications:

6.6.1 Having supply record of Equipment of the type and similar ratings proposed with successful operation/use in substations/switchyards of at least three (3) consecutive years and at least three (3) sets.

In case that the supply record of Equipment of the type and similar ratings proposed fulfilled the requirements, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use of at least one (1) year. The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgement whether or not to consider or accept the proposed developed or modified type.

OR

6.6.2 Having a letter of acceptance for manufacturing and/or fabrication of the specific Equipment issued by EGAT within the scope specified therein (For the local manufacturer).

6.7 For above 33kV through 230 kV Outdoor Type Cable Termination and Cable Termination for GIS.

Having one of the following qualifications:

6.7.1 Proposing the Equipment of the type and ratings which have ever been accepted by EGAT.

OR

6.7.2 Having a supply record of Equipment of the type and ratings proposed with successful operation/use for at least three (3) consecutive years in an overseas country (not his own country) and at least five (5) three phase sets. The ratings and features of Equipment shall be the same or similar rating as EGAT specifies.

In case that the supply record of Equipment of the type and ratings proposed fulfilled the requirement, the manufacturer may propose a newly developed or modified type of such Equipment with successful operation/use for at least one (1) year in overseas country (not his own country) and at least five (5) three phase sets. The detailed information of the development or modification shall be submitted with his proposal. EGAT, however, reserves the right and will make its own judgment whether or not to consider or accept the proposed developed or modified type.

Supply records of the higher rating Equipment shall not be accepted if the Bidder does not propose such higher rating Equipment in his bid.

6.8 For 230 kV XLPE Power Cable:

Having one of the following qualifications:

6.8.1 Having a supply record of Equipment of the type and similar ratings proposed with successful operation/use for at least three (3) consecutive years in an overseas country (not his own country).

OR

6.8.2 Having a letter of acceptance for manufacturing and/or fabrication of the specific Equipment issued by EGAT within the scope specified therein (For the local manufacturer).

6.9 Proposing the protective relay from the manufacturers as listed in EGAT's Specifications and shall be in compliance with the details specified in EGAT's Specifications. Type/Model of the main protective relays proposed shall be as specified in EGAT ACCEPTED MAIN RELAY LIST NO.1 and NO.2 attached at the end of Section A. Invitation to Bid.

6.10 For Fault Recording System:

6.10.1 Having one of the following qualifications:

6.10.1.1 The cabinet and all equipment are completely wired by the FRS manufacturer before shipping to Thailand.

OR

6.10.1.2 The cabinet and the equipment are wired in Thailand by the local cabinet manufacturer who has one of the following qualifications:

6.10.1.2.1 Having supply records of successful manufacturing/operation/use of at least three (3) units of the FRS cabinet in EGAT's Transmission System for at least three (3) consecutive years. The characteristics of the said FRS cabinets shall be as specified in "Specification No. 1003: Fault Recording System".

OR

6.10.1.2.2 Having a letter of acceptance for manufacturing of Control and Protection Boards and/or fabrication of the specific equipment issued by EGAT within the scope specified therein.

The design and engineering shall be performed by the FRS manufacturer. The assembly, factory test and commissioning shall be in accordance with the FRS manufacturer's standard and shall be performed under the FRS manufacturer's supervisor.

6.10.2 The proposed FRS shall be the product from the manufacturers as listed in EGAT ACCEPTED MANUFACTURER LIST FOR FAULT RECORDING SYSTEM which is attached at the end of Section A. Invitation to Bid and shall be in compliance with the details specified in EGAT's Specifications.

6.10.3 Type/model of the proposed FRS shall be as specified in EGAT ACCEPTED FAULT RECORDING SYSTEM LIST which is attached at the end of Section A. Invitation to Bid.

6.11 Being local manufacturer for steel supporting structure of Instrument Transformer, Surge Arrester and Disconnecting Switch.

6.12 For Closed-circuit television (CCTV) system and equipment:

6.12.1 Proposed camera and Network Video Recorder (NVR) manufacturer shall have a representative or a branch office of manufacturer in Thailand for at least ten (10) years.

6.12.2 Proposed brand of IP cameras shall have a supply record of IP cameras for at least five hundred (500) IP cameras per contract with successful operation/use for at least three (3) years in Thailand.

6.12.3 The bidder or subcontractor shall have one of the following qualifications:

6.12.3.1 Having experiences in installation and cabling of outdoor-type IP cameras for at least fifty (50) cameras per contract with successful operation/use for at least three (3) years in Thailand.

OR

6.12.3.2 Having experiences in optical fiber cabling in substation switchyards for at least five (5) substations per contract with successful operation/use for at least three (3) years in Thailand.

6.12.4 Being local manufacturer for the following Equipment: CCTV Rack cabinet, Monitoring desk, CCTV pole, 12-core ADSS optical fiber cable.

e. Proposing the manufacturer who has no just or proper claims pending against Equipment of the same type/model to be proposed under this bid.

In case the manufacturer is a new company formed by acquisition or merger with other companies or business units, the pending claim of any of such previous companies or business units shall be considered pending claim of the manufacturer.

f. Proposing reputable subcontractors, for the portion of the work to be subcontracted, having adequate technical knowledge, ability and capacity to perform such work and having at least three years experience in the performance of similar work and of equal magnitude to the work to be subcontracted. If any proposed subcontractor(s) is (are) not qualified in the opinion of EGAT, the Bidder is required to select other subcontractor(s) at his own cost to the satisfaction of EGAT.

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EGAT Accepted Bidders List for Supply and Construction of Substations

No.	Bidder / Country	Acceptance for		
		500 kV	230 kV	115&69 kV
1	ABB Limited / Thailand	YES	YES	YES
2	Grid Solutions SAS / France	YES	YES	YES
3	Hitachi Ltd. / Japan	YES	YES	YES
4	Hyosung Heavy Industries Corporation / Korea	YES	YES	YES
5	KEC International Limited / India	YES	YES	YES
6	Mitsubishi Corporation / Japan	YES	YES	YES
7	Mitsubishi Electric Corporation / Japan	YES	YES	YES
8	SEPCOIII Electric Power Construction Corporation / China	YES	YES	YES
9	Siemens Limited / Thailand	YES	YES	YES
10	Sri U-Thong Limited / Thailand	YES	YES	YES
11	TEDA Company Limited / Thailand	YES	YES	YES
12	Joint Venture of Sinohydro and SEPCOIII (Sinohydro (Thailand) Company Limited / Thailand and SEPCOIII Electric Power Construction Corporation / China)	YES	YES	YES
13	Consortium of Grid Solutions (Thailand) Ltd. and Grid Solutions SAS (Grid Solutions (Thailand) Ltd. / Thailand and Grid Solutions SAS / France)	YES	YES	YES
14	Consortium of Larsen & Toubro Limited and Sri U-Thong Limited (Larsen & Toubro Limited / India and Sri U-Thong Limited / Thailand)	YES	YES	YES
15	Consortium of Loxley Public Co., Ltd. and Sri U-Thong Limited (Loxley Public Co., Ltd. / Thailand and Sri U-Thong Limited / Thailand)	YES	YES	YES
16	Consortium of Sinohydro and SEPCOIII (Sinohydro (Thailand) Company Limited / Thailand and SEPCOIII Electric Power Construction Corporation / China)	YES	YES	YES
17	SBV Consortium (Sumitomo Corporation / Japan, Black & Veatch (Thailand) Limited / Thailand and Italian-Thai Development / Thailand)	YES	YES	YES
18	The Consortium of Mitsubishi Corporation and DEMCO Public Company Limited (Mitsubishi Corporation / Japan and DEMCO Public Company Limited / Thailand)	YES	YES	YES
19	The Consortium of Precise System and Project Co., Ltd. and Hitachi Ltd. (Precise System and Project Co., Ltd. / Thailand and Hitachi Ltd. / Japan)	YES	YES	YES
20	The Consortium of Mitsubishi Corporation and PWH (Thailand) Company Limited (Mitsubishi Corporation / Japan and PWH (Thailand) Company Limited / Thailand)	YES	YES	YES
21	Consortium of Larsen & Toubro Limited and Mitsubishi Corporation (Larsen & Toubro Limited / India and Mitsubishi Corporation / Japan)	YES	YES	YES
22	Hyundai Engineering & Construction Co., Ltd. / Korea		YES	YES
23	Larsen & Toubro Limited / India		YES	YES
24	Precise System and Project Co., Ltd. / Thailand		YES	YES
25	Kinden Corporation - Kinden (Thailand) Co., Ltd. Joint Venture (Kinden Corporation / Japan and Kinden (Thailand) Co., Ltd. / Thailand)		YES	YES
26	The Joint Venture of SRI and PWH (Sri U-Thong Limited / Thailand and PWH (Thailand) Company Limited / Thailand)		YES	YES

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EGAT Accepted Bidders List for Supply and Construction of Substations

No.	Bidder / Country	Acceptance for		
		500 kV	230 kV	115&69 kV
27	The Consortium of Kinden Corporation and Perfect Engineering Service Public Co., Ltd. (Kinden Corporation / Japan and Perfect Engineering Service Public Co., Ltd. / Thailand)		YES	YES
28	The Consortium of SCL-STC and ITE (Sinohydro Corporation Limited / China, Sinohydro (Thailand) Company Limited / Thailand and Italthai Engineering Co., Ltd. / Thailand)		YES	YES
29	The Consortium of Siemens Limited and Sinkarnchang Company Limited (Siemens Limited / Thailand and Sinkarnchang Company Limited / Thailand)		YES	YES
30	The Consortium of Siemens Limited and Standard Performance Company Limited (Siemens Limited / Thailand and Standard Performance Company Limited / Thailand)		YES	YES
31	Demco Public Company Limited / Thailand			YES
32	Hyundai Heavy Industries Co., Ltd. / Korea			YES
33	Italthai Engineering Co., Ltd. / Thailand			YES
34	Joint Venture of Sinohydro Corporation Limited and Sinohydro (Thailand) Company Limited (Sinohydro Corporation Limited / China and Sinohydro (Thailand) Company Limited / Thailand)			YES
35	Consortium ITE and HHI (Italthai Engineering Co., Ltd. / Thailand and Hyundai Heavy Industries Company Limited / Korea)			YES
36	The Consortium of Demco Public Co., Ltd. Perfect Engineering Service Public Co., Ltd. And Demco Power Co., Ltd. (Demco Public Company Limited / Thailand, Perfect Engineering Service Public Co., Ltd. / Thailand and Demco Power Co., Ltd. / Thailand			YES

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EGAT Accepted Coupling Capacitor Voltage Transformer List

Description	Manufacturer / Country	Type/Model
230 kV CCVT	ABB AB SVERIGE / Sweden	CPB 245
	GE GRID SOLUTIONS (U.S.) ALSTOM GRID LLC / U.S.A.	OTCF 245
	ELECTROTECHNICAL ARTECHE HER MANOS, S.L. / Spain	DFK-245
	NISSIN ELECTRIC (WUXI) CO., LTD. / China	WVL230-5H
	TRENCH ITALIA S.R.L. CAIRO MONTENOTTE / Italy	TCVT 245
	EMEK ELEKTRIK ENDUSTRISI A.S. / Turkey	KGT-245
115 kV CCVT	ABB AB SVERIGE / Sweden	CPB 123
	GE GRID SOLUTIONS (U.S.) ALSTOM GRID LLC / U.S.A.	OTCF 123
	ELECTROTECNICA ARTECHE HERMANOS, S.L. / Spain	DDB-123
	EMEK ELEKTRIK ENDUSTRISI A.S. / Turkey	KGT-125
	NISSIN ELECTRIC (WUXI) CO., LTD. / China	WVL115-10H
	TRENCH ITALIA S.R.L. CAIRO MONTENOTTE / Italy	TCVT 123

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EGAT Accepted Current Transformer List

Description	Manufacturer / Country	Type / Model
230 kV CT, 3000A, 50kA	ABB AB SVERIGE / Sweden	IMB 245
	ELECTROTECHNICAL ARTECHE HER MANOS, S.L. / Spain	CA-245
	NISSIN ELECTRIC CO., LTD. / Japan	FGCH-170
	TRENCH FRANCE S.A., SAINT-LOUIS / France	IOSK 245
115 kV CT, 2000A, 40kA	ABB AB SVERIGE / Sweden	IMB 123
	EMEK ELEKTRIK ENDUSTRISI A.S. / Turkey	ATH-125
	ELECTROTECHNICAL ARTECHE HER MANOS, S.L. / Spain	CA-123
	NISSIN ELECTRIC CO., LTD. / Japan	FGCH-100

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EGAT Accepted Disconnecting Switch List

Description	Manufacturer / Country	Type/Model
550 kV, 4,000 A air switch	Coelme / Italy	STC
	GE / Italy	S3CD550/4000
	Hapam / Netherlands	SSBIII-525
550 kV, 4,000 A, air switch with grounding blade	Coelme / Italy	STC-E
	GE / Italy	S3CDT550/4000
	Hapam / Netherlands	SSBIII-AM-525
245 kV, 4,000 A, air switch	Coelme / Italy	TCB
	GE / Italy	S3CD245/4000
	Hapam / Netherlands	SSBIII-245
245 kV, 4,000 A, air switch with grounding blade	Coelme / Italy	TCB-E
	GE / Italy	S3CDT245/4000
	Hapam / Netherlands	SSBIII-AM-245
245 kV, 3,150 A air switch	Coelme / Italy	TCB
	Hapam / Netherlands	SSBIII-245
	GE / Italy	S3C245/3150
245 kV, 3,150 A air switch with grounding blade	Coelme / Italy	TCB-E
	Coelme / Italy	TCB-E Special
	Hapam / Netherlands	SSBIII-AM-245
	GE / Italy	S3CT245/3150

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EGAT Accepted Disconnecting Switch List

Description	Manufacturer / Country	Type/Model
123 kV, 3,150 A air switch	Coelme / Italy	TCB
	GE / Italy	S3C123/3150
	Hapam / Netherlands	SSBIII-123
123 kV, 3,150 A air switch with grounding blade	Coelme / Italy	TCB-E
	GE / Italy	S3CT123/3150
	Hapam / Netherlands	SSBIII-AM-123
123 kV, 2,000 A air switch	Coelme / Italy	TCB
	GE / Italy	S3C123/2000
	Hapam / Netherlands	SSBIII-123
123 kV, 2,000 A air switch with grounding blade	Coelme / Italy	TCB-E Special
	GE / Italy	S3CT123/2000
	Hapam / Netherlands	SSBIII-AM-123

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EGAT Accepted Gas Insulated Switchgear List

Description	Manufacturer / Country	Type/Model	Equipment Rating			Type of Mechanism			Referenced GIS Component		
									CT	VT	Bushing (Porcelain)
			kV	A	kA	Spring	Hydraulic	Hydraulic-Spring	Manufacturer / Country	Manufacturer / Country	Manufacturer / Country
550 kV, 4000 A, 50 kA GIS	ABB / Switzerland	ELK-3	550	4000	63			✓	Pfiffner/Switzerland	Trench/Germany Ritz/Germany Pfiffner/Switzerland	LAPP/Germany
	Siemens / Germany	8DQ1P2	550	4000	50	✓			Trench/Germany	Trench/Germany	HSP/Germany
	GE / France	T155	550	4000	50	✓			Pfiffner/Switzerland ENPAY/Turkey	GE/France Ritz/Germany	PPC/Austria Ceralep/France
	Hitachi / Japan	IFT	550	6300	63		✓		Hitachi/Japan Meiden Chemical/Japan	Nissin/Japan Toko/Japan	N.G.K./Japan
	Hyundai / Korea	550SR	550	4000	63		✓		Daeyoung/Korea Hyundai/Korea	Nissin/Japan TOKO/Japan Trench/Germany	PPC/Germany PPC/Sweden TYCO/Switzerland N.G.K/Japan
	Melco / Japan	500-GPS	550	4000	50	✓			Melco/Japan	Melco/Japan	N.G.K./Japan
245 kV, 4000 A, 50 kA GIS	ABB / Switzerland	ELK-14	245	4000	63 50			✓	Pfiffner/Switzerland	Pfiffner/Switzerland Trench/Germany	LAPP/Germany
	GE / France	B105	245	4000	50	✓			ENPAY/Turkey ALCE/Turkey GE/France	GE/France	PPC Insulators/Austria Ceralep/France GE/France
	Hyosung / Korea	HSG-305B	300	4000	50	✓			Hyosung/Korea	Nissin/Japan Toko/Japan	LAPP/Germany
	XD / China	ZF9-252	245	4000	50	✓			XD/China Nanjing Zhida Electric/China	XD/China	XD/China
123 kV, 3150/2000 A, 40 kA GIS Main bus 3150 A Feeder 2000 A	ABB / China	ELK-04	145	3150	40			✓	Pfiffner/Switzerland Sihui/China	Pfiffner/Switzerland Sieyuan/China	XD/China
	Hyundai / Korea	145SP-1	123	3150	40	✓			Dongwoo/Korea	Nissin/Japan	LAPP/Germany
	Hyosung / Korea	HSG-144D	145	3150	40	✓			Hyosung / Korea	Nissin/Japan	LAPP/Germany

EGAT Accepted Power Circuit Breaker List

Description	Manufacturer / Country	Type/Model	1&3 pole	3 pole	Type of Mechanism
550 kV, 4,000 A, 50 kA GCB (Class C1)	Siemens / Germany	3AP2FI-550kV	Yes	Yes	FA5 (Spring)
	ABB / Sweden	HPL550B2	Yes	Yes	BLG1002A (Spring)
	GE / France	GL317	Yes	Yes	FK3-4 (Spring)
245 kV, 4,000 A, 50 kA GCB (Class C1)	ABB / Sweden	LTB245E1	Yes	Yes	BLK222 (Spring)
				Yes	BLG1002A (Spring)
	GE / France	GL314	Yes	Yes	FK3-1 (Spring)
	Siemens / Germany	3AP1FI-245	Yes	Yes	FA2 (Spring)
		3AP1FG-245		Yes	FA4 (Spring)
	Sieyuan / China	LW58-252	Yes	Yes	SRCT36E (Spring)
				Yes	SSCT33 (Spring)
123 kV, 3,150 A, 40 kA GCB (Class C1)	ABB / Sweden	LTB145D1/B		Yes	BLK222 (Spring)
	ABB / China	LTB145D1/B		Yes	BLK222 (Spring)
	GE / Germany	GL312F1/4031P		Yes	FK3-1 (Spring)
	Siemens / Germany	3AP1FG-123		Yes	FA2 (Spring)
	Siemens / India	3AP1FG-145kV		Yes	FA2 (Spring)
	Sieyuan / China	LW36-145		Yes	SRCT36E (Spring)

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EGAT Accepted Surge Arrester List

Description	Manufacturer / Country	Type / Model
192 kV SA	Toshiba Hamakawasaki Factory / Japan	RVLQC-192VY
	Siemens Aktiengesellschaft / Germany	3EP4 192-2PE42-1XX1-Z
	Hubbell Power Systems Inc. / USA	MVN192BB152AA
	ABB Transformer AB / Sweden	EXLIM Q192-EH245
	Tridelta Uberspannungsableiter GmbH / Germany	SB 192/10.3-0
108 kV SA	Toshiba Hamakawasaki Factory / Japan	RVLQC-108VY
	Siemens Aktiengesellschaft / Germany	3EP4 108-2PE31-1XA1-Z
	Hubbell Power Systems Inc. / USA	MVN108BB088AA
	ABB Transformer AB / Sweden	EXLIM Q108-EH123
	Tridelta Uberspannungsableiter GmbH / Germany	SB 108/10.3-0

EGAT ACCEPTED MAIN RELAY LIST No.1

Scheme	Accepted Type/Model	Manufacturer	Acceptance for			Notes
			500kV	230kV	115&69kV	
Current Differential	RED670	ABB	YES	YES	YES	
	P543	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	L90	GE	YES	YES	YES	
	SEL-311L	SEL	YES	YES	YES	
	7SD52	Siemens	YES	YES	YES	
	P543	Schneider Electric	YES	YES	YES	
	EF-LD	INGETEAM	YES	YES	YES	
	PCS-931	NR Electric	YES	YES	YES	
Distance Protection	REL670	ABB	YES	YES	YES	
	P443	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	D30	GE		YES	YES	Only for three pole tripping and line protection that no need carrier scheme.
	D60	GE		YES	YES	
	ALPSDA1	GE	YES	YES	YES	
	SEL-311C	SEL			YES	Only for three pole tripping and line protection that no need carrier scheme.
	SEL-421	SEL	YES	YES	YES	For 21P, 85, 67N. The relay with auto-reclosing function can not be accepted.
	7SA522	Siemens	YES	YES	YES	
	7SA6 series	Siemens	YES	YES	YES	
	GRZ200	Toshiba		YES	YES	
	ZLV	ZIV		YES	YES	
	P443	Schneider Electric	YES	YES	YES	
	EF-ZT	INGETEAM	YES	YES	YES	
	PCS-902	NR Electric	YES	YES	YES	
Transformer Differential	RET670	ABB	YES	YES	YES	
	RET650	ABB	YES	YES	YES	3-restraints.
	P64x	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"

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EGAT ACCEPTED MAIN RELAY LIST No.1

Scheme	Accepted Type/Model	Manufacturer	Acceptance for			Notes
			500kV	230kV	115&69kV	
Transformer Differential	T35	GE		YES	YES	
	T60	GE		YES	YES	
	Duobias	Siemens		YES	YES	The manufacturer's name "Reyrolle" is changed to "Siemens"
	SEL-387	SEL		YES	YES	4-restraints.
	SEL-487E	SEL	YES	YES	YES	
	SEL-587	SEL			YES	2-restraints.
	SEL-787	SEL			YES	2-restraints.
	7UT6	Siemens	YES	YES	YES	5-restraints.
	GRT200	Toshiba	YES	YES	YES	
	IDV	ZIV	YES	YES	YES	
	P645	Schneider Electric	YES	YES	YES	
	EF-TD	INGETEAM	YES	YES	YES	3-restraints.
	PCS-978	NR Electric	YES	YES	YES	
Busbar Protection High Impedance	REB650	ABB	YES	YES	YES	
	SEL-587Z	SEL	YES	YES	YES	
	GRB150	Toshiba	YES	YES	YES	
Busbar Protection Low Impedance	REB670	ABB	YES	YES	YES	
	REB500	ABB	YES	YES	YES	
	P746	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	P740	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	B90	GE	YES	YES	YES	
	B30	GE	YES	YES	YES	Only use in case that the bus arrangement is Breaker-and-a half, Double-bus-Double-Breaker or Main-and-Transfer.
	P747	GE	YES	YES	YES	
	SEL-487B	SEL	YES	YES	YES	
	7SS52	Siemens	YES	YES	YES	

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EGAT ACCEPTED MAIN RELAY LIST No.1

Scheme	Accepted Type/Model	Manufacturer	Acceptance for			Notes
			500kV	230kV	115&69kV	
Busbar Protection	7SS60	Siemens	YES	YES	YES	Only use in case that the bus arrangement is Breaker-and-a half, Double-bus-Double-Breaker or Main-and-Transfer.
Low Impedance	7SS85	Siemens	YES	YES	YES	
	GRB100	Toshiba	YES	YES	YES	
	P746	Schneider Electric	YES	YES	YES	
	P740	Schneider Electric	YES	YES	YES	
Breaker Failure Protection	REQ650	ABB			YES	
	P141	GE	YES	YES	YES	3-phase Breaker failure function only. The manufacturer's name "ALSTOM" is changed to "GE"
	P14Nx	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	C60	GE		YES	YES	
	F60	GE		YES	YES	
	SEL-501	SEL	YES	YES	YES	3-phase Breaker failure function only.
	P821	Schneider Electric		YES	YES	Only firmware version 1.F is accepted.
	7VK6 series	Siemens	YES	YES	YES	The function and the operating time for each system shall be conform to Specification nos. 1005 and 1002.
	GRD200	Toshiba	YES	YES	YES	
	EF-ZT	INGETEAM	YES	YES	YES	
	PCS-9611	NR Electric	YES	YES	YES	3-phase Breaker failure function only.

Note

-The procedures for being listed in EGAT ACCEPTED MAIN RELAY LIST can be requested from Transmission System Engineering Division.

-If any type of relay in the list is planned not to be manufactured, the manufacturer or the representative is responsible for informing EGAT at least 1 year before it is obsolete.

-The relays shall be configurated to comply with all EGAT's needed functions.

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EGAT ACCEPTED MAIN RELAY LIST No.2

Scheme	Accepted Type/Model	Manufacturer	Acceptance for				Notes
			500kV	230kV	69&115kV	22&33kV	
Directional Overcurrent Relay	REQ650	ABB	YES	YES	YES	YES	
	P14Dx	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	P841	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	SEL-351A	SEL	YES	YES	YES	YES	
	SEL-451	SEL	YES	YES	YES	YES	
	SEL-751	SEL	YES	YES	YES	YES	
	GRE140	Toshiba	YES	YES	YES	YES	
	GRD200	Toshiba	YES	YES	YES	YES	
	7SJ62	Siemens	YES	YES	YES	YES	
	7SJ85	Siemens	YES	YES	YES	YES	
	IRV	ZIV		YES	YES	YES	
	EF-MD	INGETEAM	YES	YES	YES	YES	
	PCS-9611	NR Electric				YES	None of line fault locator. Only use with feeder.
Overcurrent Relay	REQ650	ABB	YES	YES	YES	YES	
	P141	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	P14Dx	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	P14Nx	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE".
	P841	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	F60	GE	YES	YES	YES	YES	
	F650	GE	YES	YES	YES	YES	
	SR350	GE	YES	YES	YES	YES	
	P120	Schneider Electric	YES	YES	YES	YES	

EGAT ACCEPTED MAIN RELAY LIST No.2

Scheme	Accepted Type/Model	Manufacturer	Acceptance for				Notes
			500kV	230kV	69&115kV	22&33kV	
Overcurrent Relay	P122	Schneider Electric	YES	YES	YES	YES	
	SEL-351A	SEL	YES	YES	YES	YES	
	SEL-451	SEL	YES	YES	YES	YES	
	SEL-551	SEL	YES	YES	YES	YES	
	SEL-751	SEL	YES	YES	YES	YES	
	SEL-751A	SEL	YES	YES	YES	YES	
	7SJ61	Siemens	YES	YES	YES	YES	
	7SJ62	Siemens	YES	YES	YES	YES	
	7SJ85	Siemens	YES	YES	YES	YES	
	GRE140	Toshiba	YES	YES	YES	YES	
	GRD200	Toshiba	YES	YES	YES	YES	
	IRV	ZIV		YES	YES	YES	
	EF-MD	INGETEAM	YES	YES	YES	YES	
	PCS-9611	NR Electric	YES	YES	YES	YES	3 pole trip only
Synchronism Check Relay	REQ650	ABB	YES	YES	YES		
	SPAU140C	ABB	YES	YES	YES		
	P841	GE	YES	YES	YES		The manufacturer's name "ALSTOM" is changed to "GE"
	F60	GE	YES	YES	YES		
	F650	GE	YES	YES	YES		
	SEL-279H	SEL	YES	YES	YES		
	SEL-351A	SEL	YES	YES	YES		
	SEL-451	SEL	YES	YES	YES		
	SEL-751	SEL	YES	YES	YES		
	SEL-751A	SEL	YES	YES	YES		
	7VK61	Siemens	YES	YES	YES		
	7SJ85	Siemens	YES	YES	YES		
	GRD200	Toshiba	YES	YES	YES		

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EGAT ACCEPTED MAIN RELAY LIST No.2

Scheme	Accepted Type/Model	Manufacturer	Acceptance for				Notes
			500kV	230kV	69&115kV	22&33kV	
Synchronism Check Relay	EF-MD	INGETEAM	YES	YES	YES		
	PCS-9611	NR Electric	YES	YES	YES		
Auto Reclosing Relay	REQ650	ABB	YES	YES	YES		
	P841	GE	YES	YES	YES		The manufacturer's name "ALSTOM" is changed to "GE"
	F60	GE		YES	YES		3 pole reclose only
	F650	GE		YES	YES		3 pole reclose only
	DRS	GE		YES	YES		3 pole reclose only
	SEL-279H	SEL		YES	YES		3 pole reclose only
	SEL-351A	SEL		YES	YES		3 pole reclose only
	SEL-451	SEL		YES	YES		3 pole reclose only
	SEL-751	SEL		YES	YES		3 pole reclose only
	7VK512	Siemens	YES	YES	YES		
	7VK61	Siemens	YES	YES	YES		
	GRD200	Toshiba	YES	YES	YES		
	EF-ZT	INGETEAM	YES	YES	YES		
	PCS-9611	NR Electric		YES	YES		3 pole reclose only
Overfluxing Relay	EF-TD	INGETEAM	YES	YES	YES		
Frequency Relay	P94Vx	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
	MIV	GE		YES	YES	YES	
	SEL-351A	SEL	YES	YES	YES	YES	
	SEL-451	SEL	YES	YES	YES	YES	
	SEL-751	SEL	YES	YES	YES	YES	
	SEL-751A	SEL	YES	YES	YES	YES	
	7SJ85	Siemens	YES	YES	YES	YES	
	EF-MD	INGETEAM	YES	YES	YES	YES	
	PCS-9611	NR Electric	YES	YES	YES	YES	

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EGAT ACCEPTED MAIN RELAY LIST No.2

Scheme	Accepted Type/Model	Manufacturer	Acceptance for				Notes
			500kV	230kV	69&115kV	22&33kV	
Under/Overvoltage Relay	MIV	GE		YES	YES	YES	
	P94V	GE	YES	YES	YES	YES	None of VT input (open delta connection) for 59N.
	SEL-351A	SEL	YES	YES	YES	YES	
	SEL-751	SEL	YES	YES	YES	YES	
	SEL-751A	SEL	YES	YES	YES	YES	
	7SJ62	Siemens	YES	YES	YES	YES	
	7SJ85	Siemens	YES	YES	YES	YES	
	GRD200	Toshiba	YES	YES	YES	YES	
	IRV	ZIV	YES	YES	YES	YES	
	EF-MD	INGETEAM	YES	YES	YES	YES	
	PCS-9611	NR Electric		YES	YES	YES	C-Bank protection only

Note

- The procedures for being listed in EGAT ACCEPTED MAIN RELAY LIST can be requested from Transmission System Engineering Division.
- If any type of relay in the list is planned not to be manufactured, the manufacturer or the representative is responsible for informing EGAT at least 1 year before
- The relays shall be configurated to comply with all EGAT's needed functions.

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EGAT ACCEPTED FAULT RECORDING SYSTEM LIST

Accepted Type/Model	Manufacturer
IDM+	QUALITROL
M871	GE
7KE85	SIEMENS
TESLA 4000	ERL Phase
TR2100	Rochester (RIS)

Note

- The procedures for being listed in EGAT ACCEPTED FAULT RECORDING SYSTEM LIST can be obtained from Transmission System Engineering Division.
- If any type of FRS in the list is planned not to be manufactured, the manufacturer or the representative is reponsible for informing EGAT at least 1 year before it is obsolete.

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EGAT ACCEPTED MANUFACTURER LIST FOR PROTECTIVE RELAY

Description	Manufacturer / Country
Protective Relay	ABB / Sweden, Switzerland, USA
	GE / USA, Canada, Spain, UK
	SEL / USA
	Siemens / Germany
	Reyrolle / UK
	Toshiba / Japan, Vietnam
	Schneider Electric / France, UK
	ZIV / Spain
	INGETEAM / Spain
	NR Electric / China
	Mitsubishi / Japan

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EGAT ACCEPTED MANUFACTURER LIST FOR FAULT RECORDING SYSTEM

Description	Manufacturer / Country
Fault Recording System	Qualitrol / UK
	Siemens / Germany
	Rochester / USA
	GE / USA
	ERL Phase / Canada

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SCOPE OF WORK

H-1. General

1. 230/115 kV Lamphun 3 Substation (Job No. TS12-09-S01)

General

The new 230/115 kV GIS Substation is located at Tumbon Si Bua Ban, Amphoe Mueang, Lamphun Province. The new 230 kV Gas Insulated switchgear (GIS) is Breaker & A Half scheme. The new 115 kV Gas Insulated switchgear (GIS) is Double Bus Single Breaker scheme. The GIS modules shall be installed inside the new separately GIS building.

The Contractor shall supply equipment, perform construction and installation work necessary for completion of operation substation in accordance with the Contract Documents. The design work shall include, but not limited to, technical calculation, preparation of drawings, bill of materials for installation and construction work. For accomplishment of complete operational substation, Scope of Contractor's work shall include connection to all public utilities i.e. electrical power, water and drainage. Testing and commissioning of all equipment required to make the substation function properly.

Besides, all detailed engineering design work, calculations, drawing preparation, submission of backup data, test reports instruction books (and), etc. shall be included.

1) As stated elsewhere in this bidding documents, the drawings included in the bidding documents except drawing mark "For Construction" are for bidding purposes only and shall not be used for execution of the work.

2) The submitted drawings which are incomplete/unacceptable, or are the bidding document copies with minor modifications shall be returned unmarked to the Contractor.

3) The drawings shall be furnished which provide all details required for thoroughly described equipment as well as installation methods and requirements. However, EGAT retains the right to request additional details if those furnished are perceived inadequate.

4) Calculations, backup data and documentation are required for all parts of the design. The furnished data shall verify completely that design is adequate for application purpose.

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The Scope of work comprises two schedules as follows:

Schedule 1

Sixteen (16) Feeders of Breaker & A Half scheme at the new 230 kV GIS shall be provided for transmission lines and auto-transformers as follows:

- Two (2) feeders for 230 kV lines No.1 & No.2 to Chiang Mai 2 Substation
- Two (2) feeders for 230 kV lines No.1 & No.2 to Chiang Mai 3 Substation
- Two (2) feeders for 230 kV lines No.1 & No.2 to Lamphun 2 Substation
- Two (2) feeders for 230 kV lines No.1 & No.2 to Mae Moh 3 Substation
- Two (2) feeders for 230 kV lines No.1 & No.2 to Mae Moh 4 Substation
- Two (2) feeders for 230 kV lines No.1 & No.2 to Sop Moei Substation
- Two (2) feeders for 300 MVA, 230/115-22 kV auto-transformers "KT1A, KT2A"
- Two (2) feeders for future 3-1x333.33 MVA, 500/230-22 kV auto-transformers "KT3A, KT4A"

Schedule 2

Seven (7) Feeders of Double Bus Single Breaker scheme at the new 115 kV GIS shall be provided for transmissions lines and autotransformers as follows:

- Two (2) feeders for 115 kV Lines No. 1 & 2 to Hang Chat
- Two (2) feeders for 115 kV Lines No. 1 & 2 to Chom Thong
- Two (2) feeders for 300 MVA, 230/115-22 kV auto-transformers "KT1A, KT2A"
- One (1) feeder for Coupling bay

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

For Electrical Work

1. 230/115 kV Gas Insulated switchgear (GIS)

1.1 Design, supply and installation of equipment required for a complete 230 kV & 115 kV GIS Substation and 22 kV-400/230 V power supply system.

1.2 Design, supply and installation of miscellaneous hardware required for the following:

1.2.1 The connection between the 230 kV & 115 kV Substation

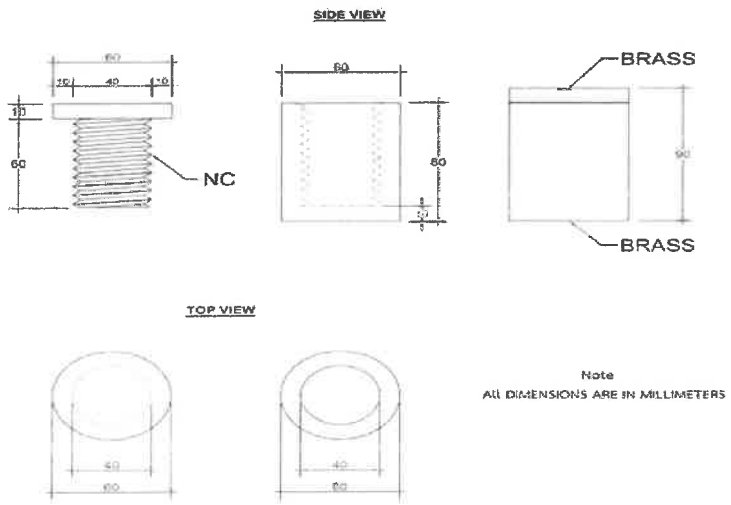
1.2.2 The connection of 230 kV GIS air bushings and 115 kV GIS air bushings to 230/115-22 kV autotransformers (KT1A, KT2A)

1.2.3 The connection of 230 kV GIS air bushings and 115 kV GIS air bushings to 230 kV & 115kV overhead lines

1.2.4 The grounding equipment and miscellaneous hardware for 300 MVA, 230/115-22 kV auto-transformers (KT1A, KT2A)

1.3 To meet EGAT's service contin uity requirements, the GIS gas compartment can be designed as indicated in the single line diagram or can be designed differently under a condition that the design of the gas compartment shall fulfill the requirements as specified in the Specification.

1.4 Supply and installation of the marking pins for the referenced positions from the main bus shall be provided in the GIS building. The positions of the marking pins shall be shown on the drawings for future GIS extension and the quantity shall be not less than 3 sets. The making pins shall be made of brass or stainless steel that have the formation as follows :



1.5 The GIB shall not be installed in multiple stacks for the purpose of convenient maintenance.

1.6 The detachable walk way (Cat walk) for visual inspection shall be properly installed on each GIS module and removable service platform, removable ladder shall be provided for GIS inspection.

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1.7 The feeder nameplates as well as phasing, device, and switching numbers shown on the GIS module shall be painted or mounted (detachable type) on the enclosure of GIS whichever is appropriate according to the instruction from EGAT GIS installation team.

1.8 The sag and tension of phase wires and overhead ground wires shall be calculated and designed according to internationally-accepted standards by the Contractor and the said calculation shall be submitted to EGAT for approval.

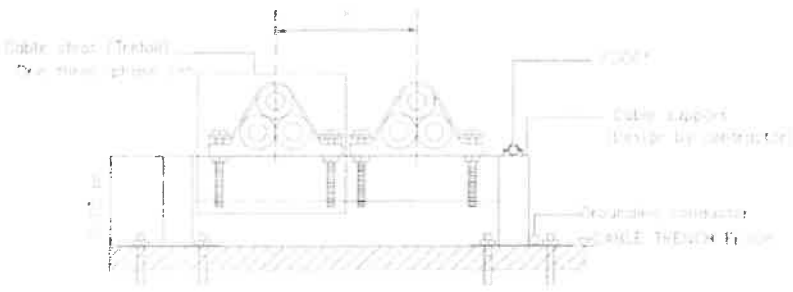
1.9 Design, supply and installation of 22 kV XLPE cable system which comprises at least the following :

1.9.1 The design and calculation of the 22 kV cable system shall conform to IEC or IEEE standards.

1.9.2 The 22 kV XLPE cable shall be single-core with copper conductor.

1.9.3 Design, supply and installation of the 22 kV XLPE cables in a 22 kV system complete from one end at the 22 kV bus to the Station service transformers KW1A and KW2A, including cable trench, cable supporting structures, cable spacers, cable cleats, cable termination supporting structures, cable terminations, miscellaneous hardware, link box, SVL (if applicable) and all related equipment. The cable cleats shall be metallic hot dip galvanized.

1.9.4 The 22 kV XLPE cable shall be installed in trefoil formation as follows:



The cable supporting structure shall be made of stainless steel, aluminum alloy or galvanized steel. The contractor shall design, supply and install the cable supporting structures that are suitable for cable cleat and cable system installation, and their grounding.

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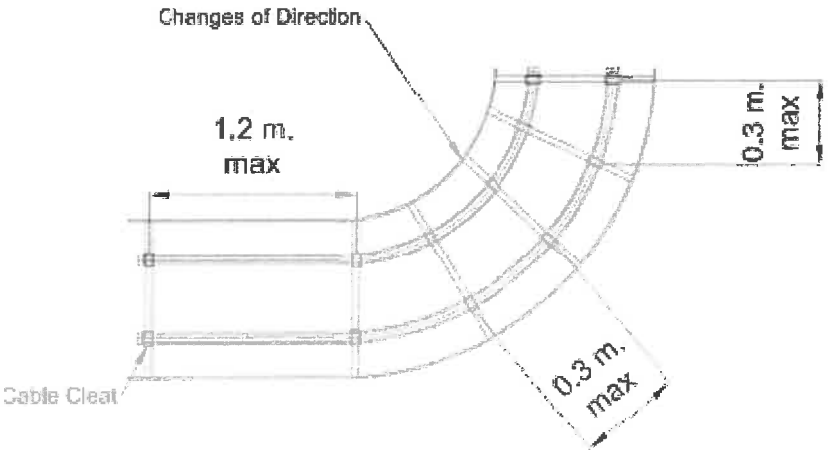
1.9.5 **Cable Cleats**: The cleats shall rigidly support and secure the cables when installed at intervals along the length of the cables. The surface of cleats shall be free from sharp edges, burrs, flash, etc. that are likely to damage cables or inflict injury to the installer or user. The cleats shall be made of aluminum or stainless steel according to IEC61914's definition. For composite materials, the integral pad shall be low smoke, low fume and halogen free. One cleat shall be provided with the closure bolt and nut assembly, and the mounting bolt and nut assembly. The closure bolt and nut shall be made of stainless steel. The cleats shall be designed conform to IEC61914 and able to resist the electromechanical force, withstanding more than one short circuit. The cleats shall be able to resist ultraviolet light (UV), very heavy impact and corrosion. The cable cleat shall have the operating temperature range from – 15°C to 105°C. For EPC project, the position and number of cable cleats shall be calculated and determined by Contractor to withstand the electromechanical force from short circuit according to IEC61914. However, the maximum span between cleats is 1.2 meters for a straight path and 0.3 meters at a bending point as follows:



For each Bid, the following document shall be submitted at the opening date to EGAT for approval;

1) The type test report or the commission test report of each structural type for

   1.1) The test for resistance to electromechanical force withstanding more than one short circuit conform to IEC61914

   1.2) The test for resistance to ultraviolet light conform to IEC61914

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2) The official letter from manufacturer or the official agent to confirm the intention to be the supplier and will supply the product according to the type test report or the commission test report.

1.9.6 For calculation of forces caused by short-circuit currents, the peak short circuit current of **62.5kA** shall be used.

1.9.7 The minimum bending radius of the 22 kV XLPE cable shall be checked by Contractor for cable installation and cable trench design.

1.9.8 The Contractor shall design the 22 kV cable system such that one (1) 1/C-35 Sq.mm. XLPE cable shall be able to carry the continuous current no less than **50 A** given that the ambient temperature is no less than 45°C and the effect of solar heat shall be considered. The other parameters used in the design shall be practical, reasonable, operational and conform to IEC or IEEE standards. The calculated continuous current rating shall be shown in the single-line diagram.

1.9.9 The Contractor shall design and select the type of metallic screen bonding. The induced voltage measured in every point of the metallic screen of 22 kV XLPE cables shall be less than 60 V or shall conform to the IEC or IEEE standards' calculation.

1.9.10 Design, supply and installation the equipment to protect the power cable from the surge and over-voltage.

2. Station Service System

2.1 Design, supply and installation of the station service system complete with integral accessories to provide the complete system operation. The abnormal condition which occurs from the design and installation of the station service system for example ferroresonance etc. shall be responsible by the Contractor. The station service system shall mainly consist of as follows:

- 630 kVA, 22,000-400/230 V distribution transformer (KW1A)
- 630 kVA, 22,000-400/230 V distribution transformer (KW2A)
- Load Center Unit Substation (LCUS)
- 22 kV drop-out fuses
- 600 V, 1000 A safety switches
- 22 kV equipment, and AC & DC distribution boards, stationary batteries, battery chargers, power cables, and all related equipment for the complete operation

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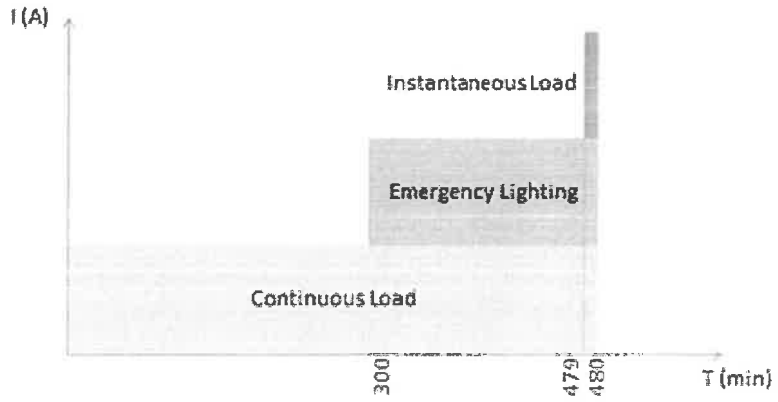
2.2 Design, supply and installation of equipment required for a complete 400/230 V power supply system.

2.3 Design, supply and installation of station service transformers (KW1A, KW2A).

2.4 Design, supply and installation of emergency lighting system for the GIS building in case of normal station service fails with the illuminance of 150 LUX for at least 3 hours as shown in figure below.

2.5 Design, supply and installation of the stationary battery, in which the battery is capable of delivering power to the control and protection for tripping all circuit breakers and emergency essential load for at least **8** hours if normal stat2ion service fails. The capacity of the battery shall not be less than **800 Ah**. In case of bus faults occurring on the last hour of battery power, the battery shall generate sufficient power for tripping all circuit breakers. The stationary battery shall be designed and calculated in accordance with IEEE or other acceptable international standards. In addition, the size of the stationary battery shall be designed to support the operation of existing and future bay as shown on the attached bidding document drawings. The calculation shall be submitted to EGAT for approval.



Battery Duty Cycle

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3. Grounding system

3.1 Design, supply and installation the grounding system of the 230 kV, 115 kV Substation grounding system including the grounding system of control & relay building, 230 kV GIS building and 115 kV GIS building and 22kV system.

3.2 The grounding conductor for the substation grounding system shall be of the 4/0 AWG bare copper wire type.

3.3 The ground grid conductors spacing under the building area shall be the same as the Switchyard.

3.4 Design, supply and installation of the grounding equipment and miscellaneous hardware for 230/115 kV system including the 22 kV power supply system and 22 kV XLPE cable system.

3.5 Design, supply and installation of the grounding system of the isolating transformer. The grounding system of the isolating transformer shall be separated from that of the substation.

3.6 The contractor shall evaluate the price of ground grid based on the specified design for price reference as below :

3.6.1 The maximum ground grid conductor spacing (D_0) shall be **5** meters.

3.6.2 The number of ground rod shall be **100** pieces.

3.7 The Contractor shall conduct the soil resistivity measurement. The result shall be submitted to EGAT for approval.

3.8 The Contractor shall design a grounding grid based on the measured soil resistivity by hand calculation using the equations in IEEE-80 standard and submitted to EGAT for Approval. The parameters for grounding system calculation shall be used as follows:

- Fault current division factor (s_f) value = **1**
- Fault current (rms) = **50 kA**
- Time duration of fault = **1** second

These parameters shall be used for determine the size of grounding conductor for the substation grounding system. If the ground conductor spacing calculated by hand (D_1) is less than the grounding conductor spacing for reference (D_0), the Contractor shall design a grounding grid by using the software. The certification of software shall be acceptable for commercial use.

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4. Lightning protection

4.1 Design, supply and installation of the substation lightning protection system complete with all related equipment. The Contractor shall design the lightning protection system for the protection of all substation equipment which is under the protective zone. To meet EGAT's design criteria for the lightning protection system and to enhance the stability of lightning protection system, the Basic Insulation Level voltage (BIL) is to be used in calculation instead of Critical Flashover voltage (CFO) as follows:

- 900 kV for 230 kV Substation
- 550 kV for 115 kV Substation

For 22 kV Substation, the stroke current of 2 kA shall be used for the calculation.

4.2 For the design of lightning protection system for the GIS building the lightning protection level (LPL) shall be used level 1 for calculation and the overhead ground wire is not permitted. Air terminal rods installed at the roof shall be used instead.

4.3 Lightning protection system shall be designed to meet IEC, NEMA and E.I.T. standards or internationally-accepted standards.

5. Facility System

5.1 Outdoor facility system

5.1.1 Design, supply and installation of a switchyard lighting system complete with all integral accessories to provide a complete system operation. The lighting system shall mainly consist of equipment lighting, fence lighting, access road lighting, power box (PRB), sign board lighting, lighting relay panel, raceways, and wiring cables for lighting circuits.

5.1.2 The lamps for outdoor facility lighting system shall be **LED** type with all integral accessories, e.g. lamp holders, fixtures, reflectors, and etc. The Contractor shall provide drawings that show details for installation.

5.1.3 Design, supply and installation of circuits for the main entrance gate. The control of the entrance gate shall be operated both manually and remote control which shall be controlled from the control room or the guardhouse.

5.2 Indoor facility system

5.2.1 Design, supply and installation of the facility system which mainly consists of lighting system, grounding system, power supply, fire alarm and protection system, and ventilation system, air-conditioning system, and telephone & LAN system in the control building, 230 kV GIS building and 115 kV GIS building. All cable wiring systems shall conform to NEC and IEC standards or internationally-accepted standards.

5.2.2 The lamps for indoor facility lighting system shall be **LED** type with all integral accessories, e.g. lamp holders, fixtures, reflectors, and etc. The Contractor shall provide drawings that show details for installation and specify the LED lamp and LED luminaire circuit identified that the LED lamp circuit shall be supplied by 2 – 3 manufacturers. The power factor of the LED lamps shall be more than 0.9.

5.2.3 All steel accessories e.g. lip-channel, conduit, conduit fittings, conduit accessories, box and cover shall be hot dip galvanized.

5.3 The size of low voltage cable shall be sufficient to keep the voltage drop at the load point less than **5%** at rated load current.

5.4 The voltage drop from the safety switch to the AC boards and from the AC boards to the load shall not exceed **3%** and **2%** respectively.

6. Telecommunication system

6.1 Design, supply and installation of the telecommunication tower 30 meters height. The telecommunication tower shall be constructed and divided into appropriate portions which are painted white and orange alternately with the top and bottom portions being painted orange. The obstruction lighting system shall be controlled by automatic flash box (AFB) that gives 30 – 60 flashes per minute. The AFB shall be turned on and turned off by a photo-light switch. The lightning protection system for the telecommunication tower shall be calculated and designed by the Contractor and the said calculation shall be submitted to EGAT for approval.

7. Other Work

7.1 Supply and Installation of miscellaneous hardware required for suspension and station post insulators assembly.

7.2 Modification of Junction box supporting structure (JB001) for the installation of safety switch.

7.3 Modification of Junction box supporting structure (JB003) for the installation of outdoor receptacle box (ORB1, ORB3).

7.4 Modification of BS203 for installation of 22 kV XLPE cables and 22 kV voltage transformers.

7.5 Design, supply and installation of cabling from the outdoor marshalling cubical (MC002) to the associated equipment.

8. Testing and commissioning

8.1 Testing and commissioning of all equipment required to make the substation function properly.

9. Control and Protection System

9.1 Design, supply, installation, wiring, test and commissioning of the complete control and protection system which comprises at least the following equipment:

- Swing-rack type protective relay switchboards
- Transducer panels
- Interposing relay panels
- Marshalling panels for the remote terminal unit
- Marshalling panels for the fault recording system
- Marshalling panels for the control system
- Marshalling panels for the teleprotection
- Fault Recording System
- 19" Rack type panel (GPS receiver and Ethernet switch panel)
- Outdoor GPS receiver system
- 400/230 VAC, 125 VDC power panel and distribution boards
- Cable and accessories as well as connection of cables among all of panels and the associated equipment in order to complete the function of the control and protection system.

9.2 Design, installation, wiring, test and commissioning of Remote Terminal Units (RTUs) and Master Station Unit which are supplied by EGAT. The configuration which is included in this Contract shall be fulfilled by the Contractor under EGAT's supervision.

9.3 Installation of the application software, database, control function and display for the Computerized Control System whereas the application software is supplied by EGAT. The installation shall be under EGAT's supervision.

9.4 The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.

10. CCTV system

Design, supply, and installation of the substation CCTV system which complies with the following qualifications:

10.1 The system can be operated 24 hours a day.

10.2 All cameras in the system shall be IP-camera type.

10.3 At least 2 monitoring locations are required, the guardhouse and the control room.

10.4 Installation space in the control room shall be prepared for rack cabinet(s) and CCTV operation desk(s) positions.

10.5 In case of outdoor installation, all devices shall be weather-proof type which can be operated in all outdoor weather conditions, robust and durable.

10.6 The bidder or a subcontractor shall be authorized by a representative or a branch office of manufacturer in Thailand.

10.7 The bidder or a subcontractor shall be able to supply the spare parts of CCTV equipment in this contract for at least five (5) years starting from the date of EGAT acceptance.

10.8 The calculation and required drawing according to the attached Bidding Document Specification shall be submitted to EGAT for approval.

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Civil and Architectural Work

230 kV Lamphun 3 Substation

11. Design and Construction of

11.1 Design and construction of 230 kV GIS building which comprises at least the following:

11.1.1 Structure & foundation. The proper structure can be selected for the design and construction and shall be submitted to EGAT for approval.

11.1.2 RC and/or steel structure for roof.

11.1.3 Fire protection for steel structure shall conform to legal provision, EGAT's specifications and Design manual for substation. Therefore, Fire protection for steel structure specification in Architecture drawing shall be canceled.

11.1.4 Architectural of the whole building.

11.1.5 The contractor shall construct the building conformed to "IEEE STD- 979- 1994 (R2004)" (IEEE Guide for Substation Fire Protection)

11.1.6 230 kV GIS buildings shall be designed with reference to Dwg. No. SD-GIS-8-01A. But equipment layouts and cable blockouts shall conform to electrical drawing (Dwg. No. SE-GIS-0-01-01/01 and Dwg.No.TYP2A-S-6). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.

11.1.7 Size of 230 kV GIS building can be selected for the design and shall be submitted with the proposal in the bidding process.

11.1.8 The design of building shall analyze and take the following aspects into consideration: Site, Environment, Context, Function, Climate (sunlight, wind, rain, heat etc.), Energy efficiency, Safety and including aesthetic of architecture to encourage EGAT corporate identity.

11.1.9 Electricity and illumination system including cable work for illumination, ventilation system and power supply.

11.1.10 Plumbing system for water supply, building drain, vent and storm drain system.

11.1.11 Miscellaneous including grounding and labeling.

11.1.12 Cable routing and cable support (Cable tray and Cable ladder) installed in cable room and main cable trench.

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11.1.13 Overhead traveling crane with wireless crane remote control of lifting capacity not less than 7.5 metric tons. Overhead traveling crane shall have cat-walk for maintenance the equipment on ceiling.

11.1.14 Signboard on building and room name sign on each room.

11.1.15 Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).

11.2 Design and construction of 230/115 kV Control Building.

11.2.1 Structure & foundation. The proper structure can be selected for the design and construction and shall be submitted to EGAT for approval.

11.2.2 RC and/or steel structure for roof.

11.2.3 Fire protection for steel structure shall conform to legal provision, EGAT's specifications and Design manual for substation. Therefore, Fire protection specification in Architecture drawing shall be canceled.

11.2.4 Architecture of the whole building.

11.2.5 The contractor shall construct the building in accordance with "IEEE STD- 979-1994 (R2004)" (IEEE Guide for Substation Fire Protection).

11.2.6 230/115 kV Control Building shall be designed with reference to Dwg. No. SD-CD-0-01A. Equipment layouts and cable blockouts shall conform to electrical drawing (Dwg. No. TYP1A-S-6). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.

11.2.7 Electricity and illumination system including cable work for illumination, ventilation system, power supply, air conditioning system, and telephone system.

11.2.8 Plumbing system for water supply, building drain and vent, storm water drainage including sanitary wares and fittings.

11.2.9 Miscellaneous including grounding and labeling.

11.2.10 Cable routing and cable support (cable tray and cable ladder) installed in cable room and main cable trench.

11.2.11 Signboard on building and room name sign on each room.

11.2.12 Access floor system or Raised flooring system (For walking area)

- Panels shall be capable of supporting a uniform load or distributed load not less than 1,500 kg./sq.m.
- Floor panels shall consist of calcium sulphate have protection against humidity, rotting and fire. Panels jig-milled to thickness and size.

  * Thickness : not less than 35 mm.

  * Module : 600x600 mm. or 24x24 Inches
- Finished the surface of the floor panels with floor covering material indicated mineral panels with High Pressure laminated (HPL) shall be not less than 1.5 mm. from manufacturer standard.
- Panels material shall be non-combustible, fire retardant, or the fire resistant building material class A, with galvanized steel plate covering both on the top and bottom of the panel.
- The understructure system of access floor such as pedestal profile, Stringer, head plate and steel bolt shall be made of Electroplated Galvanized Steel (ASTM A879)
- The system frame area which are fixed to the current system by bolting and adhesive shall be unwelded connection.
- The access floor system, following standard:

  * Load test : EN 12825 or CISCA

  * Fire test : DIN4102: F30 A or ASTM E84 Class A or BS476 part 4 Class A
- The test report shall be certified by a third party accredited laboratory.
- The pattern of access floor (Walking area) relating to cable route and equipment layout shall be submitted to EGAT for approval.
- All components of access floor system, which consist of floor panel, stringer, pedestal, and other part, shall be manufactured by the same manufacturer.
- With 10 years guarantee of material and 2 years installation.

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- The access floor system material in the Specification No.3001 (Civil and Architectural work) No.3001-10.8.3.5 Access Floor System (Raised Flooring System) and the referenced drawings of the said material shall be cancelled.

11.2.13 Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).

11.2.14 The furniture list shall be added as the follow detail.

- Complete set of pantry storage side board that consists of base cabinet and wall hanging cabinet, including one stainless sink tap and full set of pantry accessories.

Other furniture items from the reference drawing not included in this contract.

11.3 Design and construction required for a complete 230 kV Gas Insulated substation (GIS) which comprises at least the following:

11.3.1 GIB & GIS bushing structure and foundation.

11.3.2 Transformer foundation, shunt reactor foundation, specified equipment and steel structure foundations and the others not shown in "For Construction drawings" and /or EGAT's specification.

11.3.3 Drainage system and drainage system for cable trench.

11.3.4 Water supply system.

11.3.5 Cable tray for transformer, underground cable in HDPE duct.

11.3.6 Cable trench for XPLE system.

11.3.7 Remote control (shall be controlled from either the control room or the guard house) and door phone system for main entrance gate and switchyard entrance gate.

11.4 Construction required for a complete 230 kV Gas Insulated substation (GIS) which comprises at least the following:

11.4.1 Transformer foundation

11.4.2 Distribution transformer structure foundation.

11.4.3 Transformer loading

11.4.4 Dead man hook for loading transformer.

11.4.5 Take-off structure foundations.

11.4.6 Steel structure foundation.

11.4.7 Equipment support structure foundation with sub trench (if required).

11.4.8 Telecommunication tower foundation.

11.4.9 Fire wall.

11.4.10 Wire mesh fence.

11.4.11 Crushed rock surfacing.

11.4.12 Cable trench.

11.4.13 Lamp post for fence and access road lighting LED type foundation.

11.4.14 Cabinet with 2 sets of 50 lbs wheel fire extinguisher.

11.4.15 Water storage tank for fire protection system (capacity 250 cu.m.)

11.4.16 Foam house.

11.4.17 Fire pump house.

11.4.18 Oil separator.

11.4.19 Oil pit with black steel spiral-seam pipes (TIS 427-2531) with protection method according to AWWA C217, C205.

11.4.20 Switchyard entrance gate (Sliding).

11.4.21 Main entrance gate 8.00 m width (Sliding).

11.4.22 Road.

11.4.23 Guard rail.

11.4.24 Underground water tank 50 cu.m.

11.4.25 Water tank tower 15 cu.m.

11.4.26 Flag pole.

11.4.27 Site office

11.5 The drawings and calculation of all building shall be verified with adequate details for intended application and submitted to EGAT for approval.

11.6 All design works and the fabrication drawings for all steel structures shall be submitted to EGAT for approval.

11.7 All design, construction and testing shall conform to Specification No.3001: Civil and Architectural Work.

11.8 EGAT's Soil Investigation Report attached to the Contract is a document that can be a reference for design, however; the review of the soil investigation report shall be under responsibility of the Contractor and the warranty of work shall remain following all obligations as specified in the Contract.

11.9 All foundations shall be as specified on lay out drawing except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.

11.10 The contract price will be adjusted (added or reduced) in case that the soil investigation results to be used for the design works is different from the lay out and standard drawings.

11.11 The Contractor shall remove all debris from construction material and other work in order to make the site clean and be in the condition acceptable to EGAT.

11.12 The layout of Dwg. No. LN3-C-3, LN3-C-6 and LN3-C-9 shall be designed with reference to Dwg. No. TYP2A-C-3.2, TYP2A-C-6 and TYP2A-C-9 respectively.

11.13 Three minutes 3D animation presentation file (MP4, resolution not less than 1440 p; 2500 X 1440) demonstrating details of switchyard and interior and exterior buildings shall be arranged, with reference to Substation 3D Animation.mp4 attached file.

11.14 According to the Contract Document Section G-3: Contractor's Office and Other Construction Facilities; the detail in paragraph 3 shall be changed as follows: the Contractor shall provide for EGAT an office container at the site during construction with a minimum space of 36 square meters for office area, 24 square meters for conference room which shall both be air-conditioned and 4 square meters for toilet. The facilities as shown on the section G-3 are required for two sets.

12. Fire protection system

12.1 Design, supply and installation/construction of Fire protection system for 230 kV GIS building and 230/115 kV Control Building:

12.1.1 230 kV GIS building shall consist of video image smoke detector system, optical beam smoke detector and aspirated smoke detector.

12.1.2 230/115 kV Control building shall consist of Total Flood Clean Agent Fire Suppression System with heat detector, addressable type smoke detector and aspirated smoke detector.

12.1.3 Fire protection system of 230 kV GIS building and 230/115 kV Control Building shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected device, shown and recorded at control room in 230/115 kV Control Building. The installation practice shall be in accordance with the last edition of NFPA 72.

12.1.4 There shall be sounder and beacon on the roof of every building.

12.1.5 For system requirements for indoor fire protection system as shown on specification 3001-10.13.1 part e, item no.1 and 6 shall be changed to the new details as follow

(1) System description and operation: Supply and Installation of a Total Flood Clean Agent Fire Suppression System utilizing IG-100 shall cover all these zones:

Zone 1: Equipment (Control/Relay) Room;

Zone 2: Electrical Room;

Zone 3: Under Raised Floor;

Zone 4: Battery Room;

Zone 5: Cable Room;

Zone 6: Inert Gas Room

Other zone (If required)

Each protected zone shall have its own set of IG-100 cylinders.

(6) Detectors shall be cross-zoned detection requiring 2 detectors to be in alarm before discharge. A zone of A or B of addressable smoke detector and a zone C of all ASD shall be crossed.

12.1.6 For Air sampling smoke detector as shown on specification 3001 - 10.13.2 part i item no.1, 7, 13 and 14 shall be changed to the new details as followings:

i. Air Sampling Smoke Detector.

(1) Shall consist of a high sensitivity type detector, using light scatter technology.

(7) Detection system must be included in all control cabinet and can locate a scene.

(13) The minimum sensitivity settings for a single sampling hole are so that the detection system alarm at 1.5% obs/ft (4.95% obs/m) A sampling hole maximum coverage area is 400.0 sq.ft (37.2 sq.m).

(14) Maximum transport time from the most remote port to the detection unit of an air-sampling system shall be a maximum of 90 seconds.

12.1.7 Fire protection system, fire alarm system, installation room and accessories shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:

12.1.7.1 NFPA 2001: Clean Agent Fire Extinguishing Systems.

12.1.7.2 NFPA 70: National Electrical Code.

12.1.7.3 NFPA 72: National Fire Alarm Code.

12.1.7.4 NFPA 75: Standard for the Fire Protection of Information Technology Equipment.

12.1.7.5 NFPA 76: Standard for the Fire Protection of Telecommunications Facilities.

12.1.7.6 EGAT's Standard Design Manual of Fire Protection and Suppression for Substation. (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)

12.1.7.7 IEEE Std 979: IEEE Guide for Substation Fire Protection.

12.1.7.8 NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Substations.

12.1.8 There shall be one control panel for fire detection system and IG-100 fire suppression system for each room which is protected by the IG-100 fire suppression system.

12.1.9 There shall be a protective clear polycarbonate cover which can be immediately lifted or opened for all IG-100 manual release stations.

12.2 Design, supply and installation/construction of Fire protection system for the switchyard to meet the requirement as specified in IEEE Guide for Substation Fire Protection: IEEE Std 979, all requirements of NFPA 850 and EGAT's Standard Design Manual of Fire Protection and Suppression for Substation (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย).

12.3 Design, supply and installation/construction of Fire protection system for the Transformer: The Foam-Water Spray System shall comply with the following;

12.3.1 Foam-water spray system: NFPA 13, NFPA16 & NFPA 850

12.3.2 Bladder tank Vessel construction Standards: Carbon steel to ASME code section VIII for unfired pressure vessel.

12.3.3 Nozzles: NFPA 16 and as per Manufacturer's Recommendation

12.3.4 Detection system: Air Expansion Linear Heat Detection System (LHB)

12.3.5 Equipment for system: FM approved, UL Listings, Vds

12.3.6 EGAT's Standard Design Manual of Fire Protection and Suppression for Substation. (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)

12.3.7 Foam-water spray system provided for Transformer should be designed for a density of 10.2 litre/min-sq.m over the exposed surface at the transformer.

12.3.8 There shall be one linear heat detector box for each transformer.

12.3.9 There shall be one control panel for fire detection system and foam/water spray system for each transformer which is protected by the foam/water spray system.

12.4 Design, supply and installation of Fire Pump System (conformed to NFPA 14, 20, 22, 24, 72)

12.5 ASD system for cabinets shall be able to alarm and address the source of smoke within 60 seconds and no later than transport time of ASD of each cabinet.

12.6 250 cu.m water storage tank, fire pump, and jockey pump shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected devices, shown and recorded at control room in 230/115 kV Control building. The installation practice shall be in accordance with the latest edition of NFPA 72.

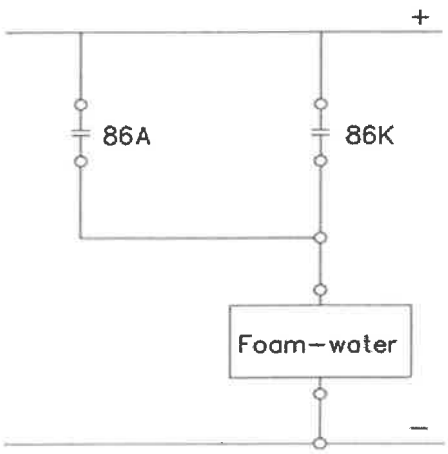
12.7 There shall be one fire alarm system graphic annunciator at each building to enable responding personnel to identify the location of a fire accurately and to indicate the status of emergency equipment or fire safety functions.

12.8 There shall be one graphic annunciator which displays alarm, discharge and trouble signals of fire alarm system of other buildings, fire pump houses and transformers at the building where control room locates.

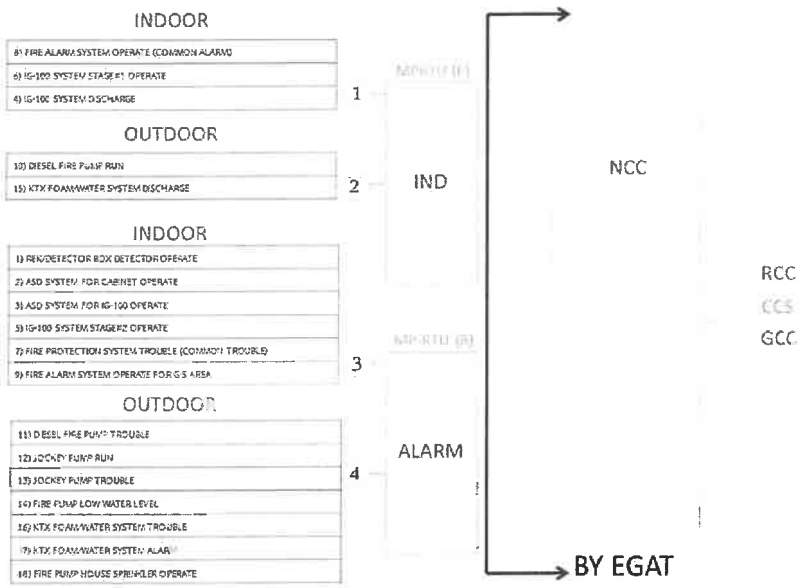
12.9 Fire protection system circuits for buildings and switchyards: notification appliance circuits, and signaling line circuits, shall be class A circuit. Initiating device circuits can be class B circuit.

12.10 For Control System Logic as shown on specification 3001-13.4 item 4.1 shall be changed to the new detail as following

(4.1) In case of fire, heat detector and the tubular expansion detector first give alarm. If rate of rise/fixed temp in heat detector/tubular expansion detector sense fire condition, there shall be alarm in control room and the detected transformer shall be tripped before applying Foam-Water spray as the condition shown in the diagram below;



12.11 Signals of indoor fire protection system of each room and signals of outdoor fire protection system of each transformer shall be sent to local CCS, GCC, RCC, and NCC as following details;



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12.12 There shall be only one subcontractor engaging in design, supply and installation of Fire Protection System for Buildings and Switchyard.

12.13 All building wall openings for fire protection dampers shall be provided with stainless steel louvers and insect screens to install inside of building.

12.14 For portable fire extinguisher as shown on specification 3001- 10.13.3 shall be changed to the new details as followings :

- The fire extinguishers shall be conformed to latest TIS standards. The portable and mobile fire extinguishers shall be carbon dioxide (CO2) conforming to TIS 881 and/or dry chemical conforming to TIS 332, capacity 10 lbs/set. The fitting accessories shall be provided.
- The portable fire extinguishers shall be installed according to the latest NFPA 10 and the latest EGAT's Standard of Fire Suppression for Substation. (ระเบียบการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ฉบับที่ 107 ว่าด้วย "มาตรฐานระบบดับเพลิงสถานีไฟฟ้าแรงสูง").

12.15 For safety sign of fire protection system shall be conformed to EGAT's Safety Sign Standard. (ระเบียบการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ฉบับที่ 100 ว่าด้วย "มาตรฐานเครื่องหมายความปลอดภัย").

12.16 Fire protection system work shall be inspected and maintained for 2 years, not less than 4 times per year and not less than manufacturers' recommendation.

12.17 The Fire pump controller shall be conform to IP66.

12.18 The contractor shall submit rubber gasket catalogue to EGAT for approval.

12.19 There shall be a set of computer desk with chair, a set of CPU which suitable for fire protection system software and operate 24 hours a day and a set of 24" LED monitor which show the status of fire protection system in control room in 230kV Control Building. If there is any video image smoke detector in GIS area, there shall be one more monitor which shows the detecting zone of each video image smoke detector. One set of laser jet printer shall be provided.

13. Testing and commissioning

13.1 Dynamic load test (DLT) conformed to ASTM D4945-89 shall be applied to at least 2% of driven piles (if driven pile type is required) except driven pile of fence and lamp post.

13.2 Seismic load test (sonic integrity test) conformed to ASTM D5882-96 shall be applied to all bored piles (if bored pile type is required).

13.3 The Contractor shall perform a static load test for GIS building foundation in accordance with ASTM D1143 (if pile type foundation is required).

13.4 Test and commissioning for inert gas system in electrical room of 230/115 kV Control building.

13.5 Test and commissioning for fire protection system in switchyard.

13.6 Test and commissioning for foam water spray of each Transformer/Shunt reactor.

13.7 Test and commissioning for fire protection system of fire pump system.

115 kV Lamphun 3 Substation

14. Design and construction of

14.1 Design and construction of 115 kV GIS building which comprises at least the following:

14.1.1 Structure & foundation. The proper structure can be selected for the design and construction and shall be submitted to EGAT for approval.

14.1.2 RC and/or steel structure for roof.

14.1.3 Fire protection for steel structure shall conform to legal provision, EGAT's specifications and Design manual for substation. Therefore, Fire protection for steel structure specification in Architecture drawing shall be canceled.

14.1.4 Architectural of the whole building.

14.1.5 The contractor shall construct the building conformed to "IEEE STD- 979- 1994 (R2004)" (IEEE Guide for Substation Fire Protection).

14.1.6 115 kV GIS buildings shall be designed with reference to Dwg. No. SD-GIS-7-01A. But equipment layouts and cable blockouts shall conform to electrical drawing (Dwg. No. SE-GIS-0-01-01/01 and Dwg.No.TYP2A-S-6). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.

14.1.7 Size of 115 kV GIS building can be selected for the design and shall be submitted with the proposal in the bidding process.

14.1.8 The design of building shall analyze and take the following aspects into consideration: Site, Environment, Context, Function, Climate (sunlight, wind, rain, heat etc.), Energy efficiency, Safety and including aesthetic of architecture to encourage EGAT corporate identity.

14.1.9 Electricity and illumination system including cable work for illumination, ventilation system and power supply.

14.1.10 Plumbing system for water supply, building drain, vent and storm drain system.

14.1.11 Miscellaneous including grounding and labeling.

14.1.12 Cable routing and cable support (Cable tray and Cable ladder) installed in cable room and main cable trench.

14.1.13 Overhead traveling crane with wireless crane remote control of lifting capacity not less than 5.0 metric tons. Overhead traveling crane shall have cat-walk for maintenance the equipment on ceiling.

14.1.14 Signboard on building and room name sign on each room.

14.1.15 Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).

14.2 Design and construction required for a complete 115 kV Gas Insulated substation (GIS) which comprises at least the following:

14.2.1 GIB & GIS bushing structure and foundation.

14.2.2 Drainage system and drainage system for cable trench.

14.2.3 Water supply system.

14.3 Construction required for a complete 115 kV Gas Insulated substation (GIS) which comprises at least the following:

14.3.1 Take-off structure foundations.

14.3.2 Steel structure foundation.

14.3.3 Equipment support structure foundation with sub trench (if required).

14.3.4 Wire mesh fence.

14.3.5 Crushed rock surfacing.

14.3.6 Cable trench.

14.3.7 Lamp post for fence and access road lighting LED type foundation.

14.3.8 Cabinet with 2 sets of 50 lbs wheel fire extinguisher.

14.3.9 Road.

14.4 The drawings and calculation of all building shall be verified with adequate details for intended application and submitted to EGAT for approval.

14.5 All design works and the fabrication drawings for all steel structures shall be submitted to EGAT for approval.

14.6 All design, construction and testing shall conform to Specification No. 3001: Civil and Architectural Work.

14.7 EGAT's Soil Investigation Report attached to the Contract is a document that can be a reference for design, however; the review of the soil investigation report shall be under responsibility of the Contractor and the warranty of work shall remain following all obligations as specified in the Contract.

14.8 All foundations shall be as specified on lay out drawing except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.

14.9 The contract price will be adjusted (added or reduced) in case that the soil investigation results to be used for the design works is different from the lay out and standard drawings.

14.10 The Contractor shall remove all debris from construction material and other work in order to make the site clean and be in the condition acceptable to EGAT.

14.11 The layout of Dwg. No. LN3-C-3, LN3-C-6 and LN3-C-9 shall be designed with reference to Dwg. No. TYP2A-C-3.2, TYP2A-C-6 and TYP2A-C-9 respectively.

14.12 Three minutes 3D animation presentation file (MP4, resolution not less than 1440 p; 2500 X 1440) demonstrating details of switchyard and interior and exterior buildings shall be arranged, with reference to Substation 3D Animation.mp4 attached file.

15. Fire protection system

15.1 Design, supply and installation/construction of Fire protection system for 115 kV GIS building:

15.1.1 115 kV GIS building shall consist of video image smoke detector system, optical beam smoke detector and aspirated smoke detector.

15.1.2 Fire protection system of 115 kV GIS building shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected device, shown and recorded at control room in 230/115 kV Control Building. The installation practice shall be in accordance with the last edition of NFPA 72.

15.1.3 There shall be sounder and beacon on the roof of every building.

15.1.4 For Air sampling smoke detector as shown on specification 3001 - 10.13.2 part i item no.1, 7, 13 and 14 shall be changed to the new details as followings:

i. Air Sampling Smoke Detector.

(1) Shall consist of a high sensitivity type detector, using light scatter technology.

(7) Detection system must be included in all control cabinet and can locate a scene.

(13) The minimum sensitivity settings for a single sampling hole are so that the detection system alarm at 1.5% obs/ft (4.95% obs/m) A sampling hole maximum coverage area is 400.0 sq.ft (37.2 sq.m).

(14) Maximum transport time from the most remote port to the detection unit of an air-sampling system shall be a maximum of 90 seconds.

15.1.5 Fire protection system, fire alarm system, installation room and accessories shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:

15.1.5.1 NFPA 70: National Electrical Code.

15.1.5.2 NFPA 72: National Fire Alarm Code.

15.1.5.3 NFPA 75: Standard for the Fire Protection of Information Technology Equipment.

15.1.5.4 NFPA 76: Standard for the Fire Protection of Telecommunications Facilities.

15.1.5.5 EGAT's Standard Design Manual of Fire Protection and Suppression for Substation. (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)

15.1.5.6 IEEE Std 979: IEEE Guide for Substation Fire Protection.

15.1.5.7 NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Substations.

15.2 Design, supply and installation/construction of Fire protection system for the switchyard to meet the requirement as specified in IEEE Guide for Substation Fire Protection: IEEE Std 979, all requirements of NFPA 850 and EGAT's Standard Design Manual of Fire Protection and Suppression for Substation (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย).

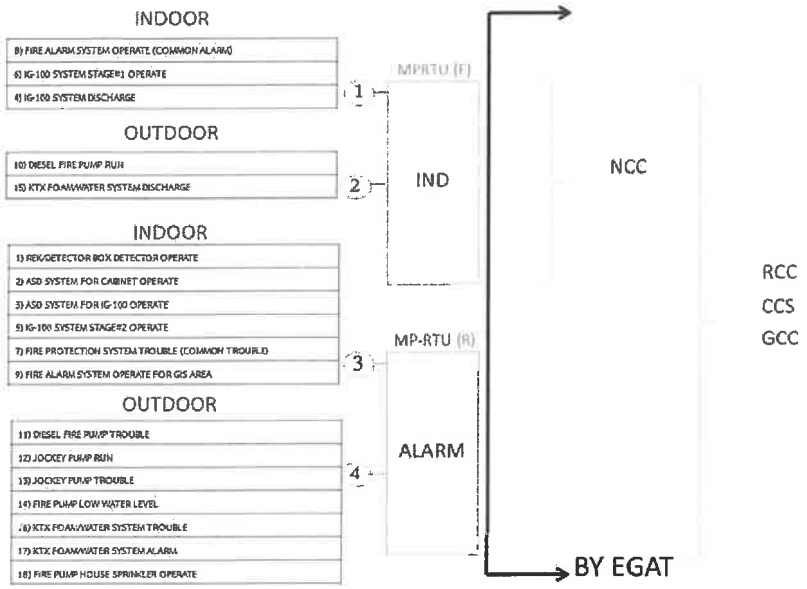
15.3 ASD system for cabinets shall be able to alarm and address the source of smoke within 60 seconds and no later than transport time of ASD of each cabinet.

15.4 There shall be one fire alarm system graphic annunciator at each building to enable responding personnel to identify the location of a fire accurately and to indicate the status of emergency equipment or fire safety functions.

15.5 There shall be one graphic annunciator which displays alarm, discharge and trouble signals of fire alarm system of other buildings, fire pump houses and transformers at the building where control room locates.

15.6 Fire protection system circuits for buildings and switchyards: notification appliance circuits, and signaling line circuits, shall be class A circuit. Initiating device circuits can be class B circuit.

15.7 Signals of indoor fire protection system of each room and signals of outdoor fire protection system of each transformer shall be sent to local CCS, GCC, RCC, and NCC as following details;



15.8 There shall be only one subcontractor engaging in design, supply and installation of Fire Protection System for Buildings and Switchyard.

15.9 All building wall openings for fire protection dampers shall be provided with stainless steel louvers and insect screens to install inside of building.

15.10 For portable fire extinguisher as shown on specification 3001-10.13.3 shall be changed to the new details as followings:

- The fire extinguishers shall be conformed to latest TIS standards. The portable and mobile fire extinguishers shall be carbon dioxide (CO2) conforming to TIS 881 and/or dry chemical conforming to TIS 332, capacity 10 lbs/set. The fitting accessories shall be provided.
- The portable fire extinguishers shall be installed according to the latest NFPA 10 and the latest EGAT's Standard of Fire Suppression for Substation. (ระเบียบการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ฉบับที่ 107 ว่าด้วย "มาตรฐานระบบดับเพลิงสถานีไฟฟ้าแรงสูง").

15.11 For safety sign of fire protection system shall be conformed to EGAT's Safety Sign Standard. (ระเบียบการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ฉบับที่ 100 ว่าด้วย "มาตรฐานเครื่องหมายความปลอดภัย").

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15.12 Fire protection system work shall be inspected and maintained for 2 years, not less than 4 times per year and not less than manufacturers' recommendation.

16. Testing and commissioning

16.1 Dynamic load test (DLT) conformed to ASTM D4945-89 shall be applied to at least 2% of driven piles (if driven pile type is required) except driven pile of fence and lamp post.

16.2 Seismic load test (sonic integrity test) conformed to ASTM D5882-96 shall be applied to all bored piles (if bored pile type is required).

16.3 The Contractor shall perform a static load test for GIS building foundation in accordance with ASTM D1143 (if pile type foundation is required).

Work not included in this Contract.

The Work not included in this Contract shall be as shown on the drawings and as follows:

1. Supply and installation of 230/115-22 kV auto-transformers "KT1A, KT2A".
2. The stringing work for the connection between the 230 kV & 115 kV substation take-off structures and the dead-end towers of the transmission lines.
3. Supply suspension and station post insulators.
4. Supply of Remote Terminal Units (RTUs), Master Station Unit and application software.

2. 230 kV Chiang Mai 3 Substation (Job No. TS12-09-S04)

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

Control and Protection System

1. Design, supply, installation, wiring, test and commissioning of the complete control and protection system which comprises at least the following equipment:
   - Swing-rack type protective relay switchboards
   - 19" Rack type panel (GPS receiver and Ethernet switch panel)
   - Outdoor GPS receiver system
   - Related accessory equipment which is required for interfacing between the existing equipment and new equipment.
   - Cable and accessories as well as connection of cables among all the new panels, the existing panels and the associated equipment in order to complete the function of the control and protection system.
2. Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:
   - The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system, etc.), interposing panel, transducer panel and fault recording system.
3. Design of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS). The test and commissioning of the completed CCS shall be performed by the Contractor.
4. The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files.
5. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.
6. Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

3. 230 kV Lamphun 2 Substation (Job No. TS12-09-S06)

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

Control and Protection System

1. Design, supply, installation, wiring, test and commissioning of the loose equipment which comprises at least the following equipment:
   - Line Differential relays (87L) for replace existing distance relay (21BU) in panel nos. 814R, 816R.
   - Related accessory equipment which is required for interfacing between the existing equipment and new equipment.
   - Loose equipment as specified in price schedule
   - Cable and accessories as well as connection of cables among all the he existing panels and the associated equipment in order to complete the function of the control and protection system.
2. Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:
   - The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system, etc.), interposing panel, transducer panel and fault recording system.
3. Design of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS). The test and commissioning of the completed CCS shall be performed by the Contractor.
4. The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files
5. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.
6. Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

4. 230 kV Mae Moh 4 Substation (Job No. TS12-09-S05)

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

Control and Protection System

1. Design, supply, installation, wiring, test and commissioning of the complete control and protection system which comprises at least the following equipment:
   - Line differential relays (87L) for replacement of the existing distance relay (21BU) in panel nos. 112R, 114R
   - Related accessory equipment which is required for interfacing between the existing equipment and new equipment.
   - Loose equipment as specified in price schedule
   - Cable and accessories as well as connection of cables among all the new equipment, the existing panels and the associated equipment in order to complete the function of the control and protection system.
2. Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:
   - The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system, etc.), interposing panel, transducer panel and fault recording system.
3. Design of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS). The test and commissioning of the completed CCS shall be performed by the Contractor.
4. The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files
5. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.
6. Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

4. 230 kV Mae Moh 4 Substation (Job No. TS12-09-S05)

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

Control and Protection System

1. Design, supply, installation, wiring, test and commissioning of the complete control and protection system which comprises at least the following equipment:
   - Line differential relays (87L) for replacement of the existing distance relay (21BU) in panel nos. 112R, 114R
   - Related accessory equipment which is required for interfacing between the existing equipment and new equipment.
   - Loose equipment as specified in price schedule
   - Cable and accessories as well as connection of cables among all the new equipment, the existing panels and the associated equipment in order to complete the function of the control and protection system.
2. Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:
   - The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system, etc.), interposing panel, transducer panel and fault recording system.
3. Design of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS). The test and commissioning of the completed CCS shall be performed by the Contractor.
4. The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files
5. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.
6. Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

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5. 230 kV Mae Moh 3 Substation (Job No. TS12-09-S03)

General

Mae Moh 3 Substation is located on Mae Moh Sub-district, Mae Moh District, Lampang Province, Thailand.

The Contractor shall furnish a complete supply of equipment, materials and installation work etc., which is necessary to complete construction substation on a supply and construction basis, in accordance with the Contract Documents.

The Contractor shall supply equipment, perform construction and installation work necessary for completion of operation substation in accordance with the Contract Documents. The design work shall include, but not limited to, technical calculation, preparation of drawings, bill of materials for installation and construction work. For accomplishment of complete operational substation, Scope of Contractor's work shall include connection to all public utilities i.e. electrical power, water and drainage. Testing and commissioning of all equipment required to make the substation function properly.

Besides, all detailed engineering design work, calculations, drawing preparation, submission of backup data, test reports instruction books (and), etc. shall be included.

1) As stated elsewhere in this bidding documents, the drawings included in the bidding documents except drawing mark "For Construction" are for bidding purposes only and shall not be used for execution of the work.

2) The submitted drawings which are incomplete/unacceptable, or are the bidding document copies with minor modifications shall be returned unmarked to the Contractor.

3) The drawings shall be furnished which provide all details required for thoroughly described equipment as well as installation methods and requirements. However, EGAT retains the right to request additional details if those furnished are perceived inadequate.

4) Calculations, backup data and documentation are required for all parts of the design. The furnished data shall verify completely that design is adequate for application purpose.

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Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

For Electrical Work

1. **The existing 230 kV Conventional Substation at Mae Moh 3 substation is breaker and a half arrangement. It shall be improved as outlined in the bidding drawings.**

   1.1 Design, supply and installation of miscellaneous hardware for the connection equipment required for a complete 230 kV.

   1.2 Supply and installation of miscellaneous hardware required for suspension and station post insulator assembly.

   1.3 Rearrangement of 230 kV Line no.1 & no.2 from Mae Moh 3 – Chiang Mai 3 to Mae Moh 3 – Lamphun 3.

2. **Testing and commissioning**

   2.1 Testing and commissioning of all equipment required to make the substation function properly.

3. **Other work**

   3.1 Removal of Wave traps (TZ0B and TZ1B) in the existing conventional substation. Details of removal are shown in the bidding document drawings

   3.2 All removed equipment from removal and replacement shall be carefully packed by the contractor and returned to EGAT.

4. **Control and Protection System**

   4.1 Design, supply, installation, wiring, test and commissioning of the existing control and protection system which comprises at least the following equipment:

   - Line differential relays (87L) replace existing distance relay (21P1) in panel nos. 503R, 507R.
   - Distance relays (21P) replace existing distance relay (21P2) in panel nos. 504R, 508R.
   - Related accessory equipment which is required for interfacing between the existing equipment and new equipment.
   - Loose equipment as specified in price schedule.

- Cable and accessories as well as connection of cables among all the new equipment, the existing panels and the associated equipment in order to complete the function of the control and protection system.

4.2 Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:

- The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system, etc.), interposing panel, transducer panel and fault recording system.

4.3 Design of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS). The test and commissioning of the completed CCS shall be performed by the Contractor.

4.4 The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files.

4.5 The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.

4.6 Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

6. 115 kV Chom Thong Substation (Job No. TS12-09-S02)

General

Chom Thong Substation is located on Khuang Pao, Chom Thong District, Chiang Mai, Thailand.

Chom Thong Substation is currently an end substation of the network. The substation is supplied via only one circuit of 115 kV Lamphun 2 – Chom Thong line. Due to the rapid increasing of power demand, the power system study indicates that the power failure problem at Chom Thong Substation will be observed if a line outage is applied to the 115 kV single-circuit Lamphun 2 - Chom Thong line. To solve the voltage regulation problem and improve the reliability of power supply, the expansion of 115 kV switchyard at Chom Thong Substation for 2 incoming line from Lamphun 3 Substation is necessary.

The Contractor shall furnish a complete supply of equipment, materials and installation work etc., which is necessary to complete construction substation on a supply and construction basis, in accordance with the Contract Documents.

The Contractor shall supply equipment, perform construction and installation work necessary for completion of operation substation in accordance with the Contract Documents. The design work shall include, but not limited to, technical calculation, preparation of drawings, bill of materials for installation and construction work. For accomplishment of complete operational substation, Scope of Contractor's work shall include connection to all public utilities i.e. electrical power, water and drainage. Testing and commissioning of all equipment required to make the substation function properly.

Besides, all detailed engineering design work, calculations, drawing preparation, submission of backup data, test reports instruction books (and), etc. shall be included.

1) As stated elsewhere in this bidding documents, the drawings included in the bidding documents except drawing mark "For Construction" are for bidding purposes only and shall not be used for execution of the work.

2) The submitted drawings which are incomplete/unacceptable, or are the bidding document copies with minor modifications shall be returned unmarked to the Contractor.

3) The drawings shall be furnished which provide all details required for thoroughly described equipment as well as installation methods and requirements. However, EGAT retains the right to request additional details if those furnished are perceived inadequate.

4) Calculations, backup data and documentation are required for all parts of the design. The furnished data shall verify completely that design is adequate for application purpose.

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For Electrical Work

The existing 115 kV switchyard at Chom Thong Substation is outdoor conventional type, with main and transfer switching arrangement. It shall be expanded and improved as outlined in the drawings as follows:

- Add one(1) new bay for existing 115 kV Line to Lamphun 2 Substation.
- Add one(1) new bay for new 115 kV Line No. 2 to Lamphun 3 Substation.
- Improve one(1) bay for new 115 kV Line No.1 to Lamphun 3 Substation.
- Improve one(1) bay for 115 kV to KT2A.
- Improve one(1) bay for 115 kV Line to PEA.

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

1. 115 kV Conventional Substation

1.1 Design, supply and installation of equipment required for a complete 115 kV Conventional Substation.

1.2 Design, supply and installation of the required equipment and related accessories for additional 115 kV line No.1 & No.2 to Lamphun 3 Substation added in the existing and new bays, respectively.

1.3 Design, supply and installation of the required equipment and related accessories for relocated 115 kV line to Lamphun 2 Substation added in the new bay.

1.4 Design, supply and installation of Current Transformer and related accessories (for KT2A and line to PEA) to improve Control and Protection System.

1.5 The Contractor shall expand the existing Control building.

2. Grounding system

2.1 Design, supply and installation of the grounding system of the following:

- 115 kV system

The grounding conductor for the substation grounding system shall be of the 4/0 AWG bare copper wire type.

2.2 Design, supply and installation of the grounding equipment and miscellaneous hardware for the 115 kV system.

2.3 The fault current division factor (sf) value = **1** shall be used for determining the RMS symmetrical grid current.

2.4 The **40 kA** fault current and fault clearing time (t_f) of **1** second shall be used for determining the size of grounding conductors for the substation grounding system.

2.5 The contractor shall design, supply and install the conductor size 2 x 4/0 AWG bare copper wire type connect from ground grid to steel structure and equipment.

3. Lightning protection

3.1 Design, supply and installation of the substation lightning protection system complete with all related equipment. The Contractor shall design the lightning protection system for the protection of all substation equipment which is under the protective zone. To meet EGAT's design criteria for the lightning protection system and to enhance the stability of lightning protection system, the Basic Insulation Level voltage (BIL) of

- 550 kV for 115 kV Substation shall be used for the calculation instead of Critical Flashover voltage (CFO).

3.2 For the design of lightning protection system for the expanded building, the overhead ground wire is not permitted. Air terminal rods installed at the roof shall be used instead.

3.3 Lightning protection system shall be designed to meet IEC, NEMA and E.I.T. standards or internationally-accepted standards.

4. Facility System

4.1 Outdoor facility system:

4.1.1 Design, supply and installation of a substation lighting system complete with all integral accessories to provide a complete system operation. The lighting system shall mainly consist of equipment lighting, raceways, and wiring cables for lighting circuits.

4.1.2 The lamps for outdoor facility lighting system shall be **LED** type with all integral accessories, e.g. lamp holders, fixtures, reflectors, and etc. The Contractor shall provide drawings that show details for installation.

4.2 Indoor facility system:

4.2.1 Design, supply and installation of the Control building facility system which mainly consists of lighting system, grounding system, power supply, fire alarm and protection system, and ventilation system, air-conditioning system, and telephone & LAN system in the GIS building. All cable wiring systems shall conform to NEC and IEC standards or internationally-accepted standards.

4.2.2 The lamps for indoor facility lighting system shall be **LED** type with all integral accessories, e.g. lamp holders, fixtures, reflectors, and etc. The Contractor shall provide drawings that show details for installation.

4.3 The size of low voltage cable shall be sufficient to keep the voltage drop at the load point less than 5% at rated load current.

5. Other Work

5.1 Supply and replaced circuit breaker No. 52-34 of Existing A/C Board.

5.2 Testing and commissioning of all equipment required to make the substation function properly.

5.3 Supply and installation of all hardware for 115 kV suspension and post insulator assembly.

5.4 Installation of 115 kV suspension and post insulators.

5.5 Removal of the equipment in the existing conventional substation. Details of removal are shown on the bidding document drawings.

5.6 All removed equipment from removal and replacement shall be carefully packed by the Contractor and returned to EGAT.

6. Testing and commissioning

6.1 Testing and commissioning of all equipment required to make the substation function properly.

7. Control and Protection System

7.1 Design, supply, installation, wiring, test and commissioning of the complete control and protection system which comprises at least the following equipment:

- Swing-rack type protective relay switchboards
- Transducer panels
- Interposing relay panels

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- Marshalling panels for the remote terminal unit
- Marshalling panels for the fault recording system
- Marshalling panels for the control system
- Marshalling panels for the teleprotection
- Fault Recording System
- 19" Rack type panel (GPS receiver Panel)
- Outdoor GPS receiver system
- 400/230 VAC and 125 VDC distribution board
- Cable and accessories as well as connection of cables among all the new panels, the existing panels and the associated equipment in order to complete the function of the control and protection system.

7.2 Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:

- The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system and etc.), interposing panel, transducer panel, fault recording system, metering panel and C-bank protection panel.

7.3 Design, installation, wiring, test and commissioning of Remote Terminal Units (RTUs) and Master Station Unit which are supplied by EGAT. The configuration which is included in this contract shall be fulfilled under EGAT's supervision.

7.4 Installation of the application software, database, control function and display for the Computerized Control System whereas the application software is supplied by EGAT. The installation shall be under EGAT's supervision.

7.5 The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files.

7.6 The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.

7.7 Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

Civil and Architectural Work

8. Design and Construction of

8.1 Modification of the existing 115 kV Control Building for installation of Control and Protection system (Existing to be extended).

8.1.1 Modify Telecommunication and Electrical Room in an existing Control Building to support Control and Protection cabinets (1,000 kg for Swing-rack cabinet and 3,000 kg for other cabinet).

8.1.2 Structure & foundation. The proper structure can be selected for the design and construction and shall be submitted to EGAT for approval.

8.1.3 RC and/or steel structure for roof.

8.1.4 Fire protection for steel structure shall conform to legal provision, EGAT's specifications and Design manual for substation. Therefore, Fire protection specification in Architecture drawing shall be canceled.

8.1.5 Architecture of the whole building.

8.1.6 The contractor shall construct the building in accordance with "IEEE STD- 979-1994 (R2004)" (IEEE Guide for Substation Fire Protection).

8.1.7 115 kV Control Building shall be designed with reference to Dwg. No. BMN-CD-7-01A. Equipment layouts and cable blockouts shall conform to electrical drawing (Dwg. No. CTG-S-6). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.

8.1.8 Electricity and illumination system including cable work for illumination, ventilation system, power supply, air conditioning system, and telephone system.

8.1.9 Plumbing system for water supply, building drain and vent, storm water drainage including sanitary wares and fittings.

8.1.10 Miscellaneous including grounding and labeling.

8.1.11 Cable routing and cable support (cable tray and cable ladder) installed in cable room and main cable trench.

8.1.12 Signboard on building and room name sign on each room.

8.1.13 Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).

8.2 Design and construction of

8.2.1 Drainage system and drainage system for cable trench.

8.3 Construction of

8.3.1 Steel structure foundation.

8.3.2 Equipment support structure foundation with sub trench (if required).

8.3.3 Crushed rock surfacing.

8.3.4 Cable trench.

8.3.5 Site office

8.4 The drawings and calculation of all building shall be verified with adequate details for intended application and submitted to EGAT for approval.

8.5 All design works and the fabrication drawings for all steel structures shall be submitted to EGAT for approval.

8.6 All design, construction and testing shall conform to Specification No. 3001: Civil and Architectural Work.

8.7 EGAT's Soil Investigation Report attached to the Contract is a document that can be a reference for design, however; the review of the soil investigation report shall be under responsibility of the Contractor and the warranty of work shall remain following all obligations as specified in the Contract.

8.8 All foundations shall be as specified on lay out drawing except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.

8.9 The contract price will be adjusted (added or reduced) in case that the soil investigation results to be used for the design works is different from the lay out and standard drawings.

8.10 The Contractor shall remove all debris from construction material and other work in order to make the site clean and be in the condition acceptable to EGAT.

8.11 According to the Contract Document Section G-3: Contractor's Office and Other Construction Facilities; the detail in paragraph 3 shall be changed as follows: the Contractor shall provide for EGAT an office container at the site during construction with a minimum space of 36 square meters for office area, 24 square meters for conference room which shall both be air-conditioned and 4 square meters for toilet. The facilities as shown on the section G-3 are required for two sets.

9. Fire protection system

9.1 Design and construction of

9.1.1 Modification of the existing 115 kV Control Building for installation of fire protection system.

9.1.1.1 Modify Storage Room in an existing 115 kV Control Building to support Inert Gas Room.(LL $\geq$ 1200 kg/sq.m)

9.1.1.2 Modify ceiling, door and window system of Control Room, Battery Room and Storage Room in an existing 115 kV Control Building to support fire protection system.

9.1.2 Fire protection system for 115 kV Control Building.

9.1.2.1 Control Building shall consist of Total Flood Clean Agent Fire Suppression System with heat detector, addressable type smoke detector and aspirated smoke detector.

9.1.2.2 Fire protection system of 115 kV Control Building shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected device, shown and recorded at control room in 115 kV Control Building. The installation practice shall be in accordance with the last edition of NFPA 72.

9.1.2.3 There shall be sounder and beacon on the roof of the building.

9.1.2.4 For system requirements for indoor fire protection system as shown on specification 3001-10.13.1 part e, item no.1 and 6 shall be changed to the new details as follow:

(1) System description and operation: Supply and Installation of a Total Flood Clean Agent Fire Suppression System utilizing IG-100 shall cover all these zones:

Zone 1: Equipment (Control/Relay) Room;

Zone 2: Electrical Room;

Zone 3: Under Raised Floor (If Required);

Zone 4: Battery Room;

Zone 5: Cable Room (If required);

Zone 6: Inert Gas Room

Other zone (If required)

Each protected zone shall have its own set of IG-100 cylinders.

(6) Detectors shall be cross-zoned detection requiring 2 detectors to be in alarm before discharge. A zone of A or B of addressable smoke detector and a zone C of all ASD shall be crossed.

9.1.2.5 For air sampling smoke detector as shown on specification 3001-10.13.2 part i item no.1, 7, 13 and 14 shall be changed to the new details as followings:

i. Air Sampling Smoke Detector.

(1) Shall consist of a high sensitivity type detector, using light scatter technology.

(7) Detection system must be included in all control cabinet and can locate a scene.

(13) The minimum sensitivity settings for a single sampling hole are so that the detection system alarm at 1.5% obs/ft (4.95% obs/m). A sampling hole maximum coverage area is 400.0 sq.ft (37.2 sq.m).

(14) Maximum transport time from the most remote port to the detection unit of an air-sampling system shall be a maximum of 90 seconds.

9.1.2.6 Fire protection system, fire alarm system, installation room and accessories shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:

- NFPA 2001: Clean Agent Fire Extinguishing Systems.
- NFPA 70: National Electrical Code.
- NFPA 72: National Fire Alarm Code.
- NFPA 75: Standard for the Fire Protection of Information Technology Equipment.
- NFPA 76: Standard for the Fire Protection of Telecommunications Facilities.
- EGAT's Standard Design Manual of Fire Protection and Suppression for Substation.(คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)
- IEEE Std 979: IEEE Guide for Substation Fire Protection
- NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Substations.

9.1.2.7 There shall be one control panel for fire detection system and IG-100 fire suppression system for each room which is protected by the IG-100 fire suppression system.

9.1.2.8 There shall be a protective clear polycarbonate cover which can be immediately lifted or opened for all IG-100 manual release stations.

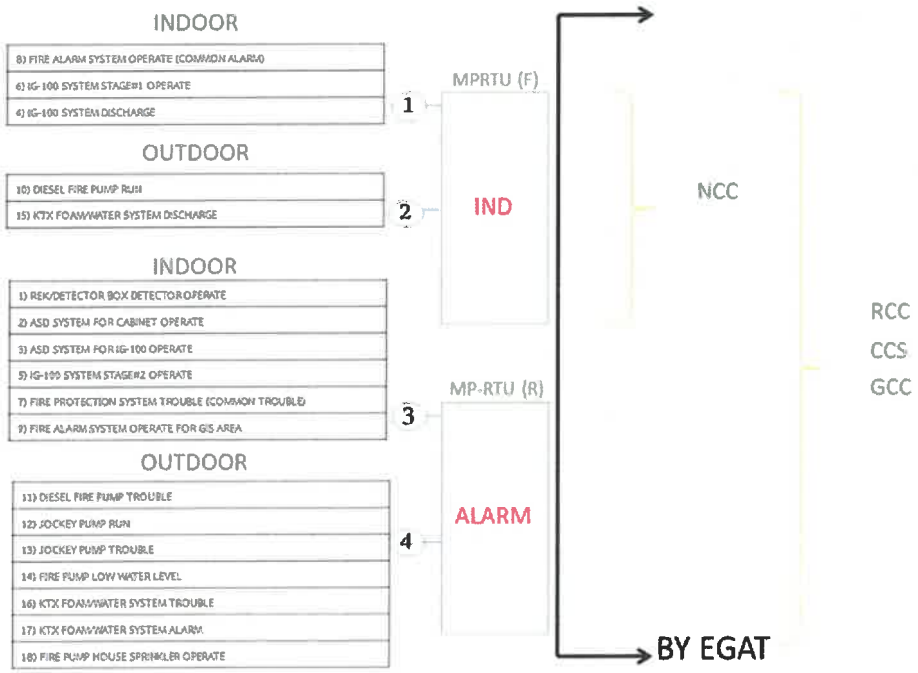
9.1.3 ASD system for cabinets shall be able to alarm and address the source of smoke within 60 seconds and no later than transport time of ASD of each cabinet.

9.1.4 ASD system for cabinets shall be omitted for energized electrical cabinets.

9.1.5 Fire protection system for the switchyard to meet the requirement as specified in IEEE Guide for Substation Fire Protection: IEEE Std 979, all requirements of NFPA 850 and EGAT's Standard Design Manual of Fire Protection and Suppression for Substation (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย).

9.1.6 Fire protection system circuits for buildings and switchyards: notification appliance circuits, and signaling line circuits, shall be class A circuit. Initiating device circuits can be class B circuit.

9.1.7 Signals of indoor fire protection system of each room and signals of outdoor fire protection system of each transformer shall be sent to local CCS, GCC, RCC, and NCC as following details;



9.1.8 There shall be only one subcontractor engaging in design, supply and installation of Fire Protection System for Buildings and Switchyard.

9.1.9 All building wall openings for fire protection dampers shall be provided with stainless steel louvers and insect screens to install inside of building.

9.1.10 For portable fire extinguisher as shown on specification 3001-10.13.3 shall be changed to the new details as followings:

- The fire extinguishers shall be conformed to latest TIS standards. The portable and mobile fire extinguishers shall be carbon dioxide (CO2) conforming to TIS 881 and/or dry chemical conforming to TIS 332 , capacity 10 lbs/set. The fitting accessories shall be provided.
- The portable fire extinguishers shall be installed according to the latest NFPA 10 and the latest EGAT's Standard of Fire Suppression for Substation. (ระเบียบการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ฉบับที่ 107 ว่าด้วย "มาตรฐานระบบดับเพลิงสถานีไฟฟ้าแรงสูง")

9.1.11 For safety sign of fire protection system shall be conformed to EGAT's Safety Sign Standard. (ระเบียบการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย ฉบับที่ 100 ว่าด้วย "มาตรฐานเครื่องหมายความปลอดภัย")

9.1.12 Fire protection system work shall be inspected and maintained for 2 years, not less than 4 times per year and not less than manufacturers' recommendation.

9.1.13 There shall be a set of computer desk with chair, a set of CPU which suitable for fire protection system software and operate 24 hours a day and a set of 24" LED monitor which show the status of fire protection system in control room in 115 kV Control Building. If there is any video image smoke detector in GIS area, there shall be one more monitor which shows the detecting zone of each video image smoke detector. One set of laser jet printer shall be provided.

9.2 Construction of

9.2.1 Cabinets with 2x50 lbs wheel fire extinguisher.

10. Testing and commissioning

10.1 Plate bearing test according to ASTM D1194-94 shall be submitted to EGAT for approval (if pad type foundation is required).

10.2 Test and commissioning for inert gas system in control room of 115 kV Control building.

Work not included in this Contract.

The Work not included in this Contract shall be as shown on the drawings and as follows:

1. The stringing work for the connection between the 115 kV substation take-off structures and the dead-end tower of the transmission lines.
2. Supply of 115 kV suspension and post insulator.
3. Supply of Remote Terminal Units (RTUs), Master Station Unit and application software.

7. 115 kV Hang Chat Substation (Job No. TIPN-02-S03)

Work included in this Contract.

The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

Control and Protection System

1. Design, supply, installation, wiring, test and commissioning of the complete control and protection system which comprises at least the following equipment:
   - Line differential relays (87L) for replace existing line differential relays (87L) in panel nos. 6R, 7R.
   - Related accessory equipment which is required for interfacing between the existing equipment and new equipment.
   - Cable and accessories as well as connection of cables among all the new equipment, the existing panels and the associated equipment in order to complete the function of the control and protection system.
2. Design, modification, wiring, test and commissioning of the existing equipment which comprises at least the following equipment in order to incorporate the new equipment:
   - The existing panels such as 400/230 VAC board, 125 VDC board, existing control and protection panels, marshalling panels (e.g. for the remote terminal unit, the fault recording system, teleprotection, control system, etc.), interposing panel, transducer panel and fault recording system.
3. Design of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS). The test and commissioning of the completed CCS shall be performed by the Contractor.
4. The existing drawings shall be modified by the Contractor and submitted to EGAT for approval. The final drawings shall be submitted as ACAD files
5. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system.
6. Removal of the unused existing cables. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.