Public Relations Information and Channels for Submitting Suggestions or Complaints Regarding the Promotion of Integrity and Transparency in Operations

Channels for Submitting Suggestions or Complaints *

Submission of Suggestions or Complaints via the EGAT Official Website *

EGAT Supplier Code of Conduct **

* This is not a channel for submitting comments on the draft Terms of Reference (TOR), draft technical specifications for procurement, draft announcements, or draft bidding documents.

** EGAT has established and published the Supplier Code of Conduct to provide all EGAT suppliers with guidelines for conducting business ethically and with good governance, taking into account environmental, social, and corporate governance (ESG) principles, legal compliance, and respect for human rights, as detailed in the EGAT Supplier Code of Conduct QR Code.

ข้อมูลประชาสัมพันธ์และช่องทางรับข้อคิดเห็นหรือข้อร้องเรียน ด้านการส่งเสริมคุณธรรมและความโปร่งใสในการดำเนินการ

นโยบายต่อต้านการให้หรือรับสินบนเพื่อป้องกันการทุจริตและประพฤติมิชอบ

จรรยาบรรณของผู้ปฏิบัติงานจัดซื้อจัดจ้างและบริหารพัสดุ

ช่องทางรับข้อคิดเห็นหรือข้อร้องเรียน *

การแจ้งข้อคิดเห็นหรือข้อร้องเรียนทางเว็บไซต์ กฟผ. *

จรรยาบรรณคู่ค้า กฟผ. **

* ไม่ใช่ช่องทางแสดงความคิดเห็นร่างขอบเขตของงานหรือรายละเอียดคุณลักษณะเฉพาะของพัสดุที่จะซื้อหรือจ้าง/ ร่างประกาศ/ ร่างเอกสารประกวดราคาฯ

** กฟผ. จัดทำและเผยแพร่จรรยาบรรณคู่ค้า เพื่อให้คู่ค้าของ กฟผ. ทุกรายมีแนวปฏิบัติในการดำเนินธุรกิจอย่างมีจริยธรรมและธรรมาภิบาล โดยคำนึงถึงสิ่งแวดล้อม สังคม การกำกับดูแลกิจการที่ดี ปฏิบัติตามกฎหมาย และเคารพหลักสิทธิมนุษยชน ดังมีรายละเอียดระบุใน QR Code จรรยาบรรณคู่ค้า กฟผ."

Notice to Bidder

To comply with the ENGINEER ACT, B.E. 2542

FOR THE CONSTRUCTION WORK RELATED TO DESIGN OR CONSTRUCTION SUPERVISION WORK

The Contractors should be aware of the following:

1. The Contractor who is a juristic person is required to obtain a License to Practice the Controlled Engineering Profession issued by the Council of Engineers Thailand.
2. Where the Contractor is a joint venture or consortium, the Contractor shall comply with the following requirements: -
   1) In case of a joint venture, the joint venture is required to obtain a License to Practice the Controlled Engineering Profession issued by the Council of Engineers Thailand.
   2) In case of a consortium, only the member of the consortium who will be responsible for the Design or Construction Supervision Work is required to obtain a License to Practice the Controlled Engineering Profession issued by the Council of Engineers Thailand.

NOTE : If you have any questions, please contact COUNCIL OF ENGINEERS THAILAND.

Address : 1616/1 Ladprao, Wangthonglang, Bangkok, Thailand 10310

Telephone : 1303

Email : coe@saraban.mail.go.th

ประชาสัมพันธ์ผู้ประกอบการเพื่อทราบ

เพื่อให้การดำเนินงานสำหรับงานจ้างก่อสร้างที่มีลักษณะงานด้านการออกแบบหรือควบคุมงานก่อสร้าง สอดคล้องกับพระราชบัญญัติวิศวกร พ.ศ. 2542 จึงขอแจ้งแนวทางในการดำเนินงาน ดังนี้

1. ผู้รับจ้างที่เป็นนิติบุคคล ต้องเป็นผู้ที่ได้รับใบอนุญาตประกอบวิชาชีพวิศวกรรมควบคุมสำหรับนิติบุคคลจากสภาวิศวกร

2. ผู้รับจ้างที่ดำเนินการในรูปแบบของ “กิจการร่วมค้า”

(1) กรณีที่กิจการร่วมค้าได้จดทะเบียนเป็นนิติบุคคลใหม่ กิจการร่วมค้านั้นต้องเป็นผู้ที่ได้รับใบอนุญาตประกอบวิชาชีพวิศวกรรมควบคุมสำหรับนิติบุคคลจากสภาวิศวกร

(2) กรณีที่กิจการร่วมค้าไม่ได้จดทะเบียนเป็นนิติบุคคลใหม่ เฉพาะนิติบุคคลที่มีหน้าที่เป็นผู้รับผิดชอบงานวิศวกรรมออกแบบหรือควบคุม ต้องเป็นผู้ที่ได้รับใบอนุญาตประกอบวิชาชีพวิศวกรรมควบคุมสำหรับนิติบุคคลจากสภาวิศวกร

หมายเหตุ หากมีข้อสงสัย โปรดติดต่อ สภาวิศวกร

ที่อยู่ : 1616/1 ถนนลาดพร้าว แขวงวังทองหลาง เขตวังทองหลาง กรุงเทพมหานคร 10310

เบอร์ติดต่อ : 1303

อีเมล : coe@saraban.mail.go.th

EGAT's Privacy Notice on Procurement, Inventory Management and Contract Administration

Electricity Generating Authority of Thailand (EGAT) has performed the protection of the Personal Data regarding procurement, inventory management and contract administration to be in accordance with **the Personal Data Protection Act B.E. 2562** (the "2019 PDPA"), which comes into effect on June 1, 2022.

Details about EGAT's Privacy Notice on Procurement, Inventory Management and Contract Administration are available for you at https://www.egat.co.th/privacy-notice-procurement_en.html or the below QR Code.

The Redaction of Sensitive Personal Data

EGAT has announced the Privacy Notice on Procurement, Inventory Management and Contract Administration for the collection, use or disclosure of Personal Data, excluding the Sensitive Personal Data.

Should the documents you wish to submit to EGAT contain the Sensitive Personal Data as defined in Section 26 of the 2019 PDPA, pertaining to racial, ethnic origin, political opinions, cult, religious or philosophical beliefs, sexual behavior, criminal records, health data, disability, trade union information, genetic data, biometric data, or of any data which may affect you in the same manner, you shall redact or conceal such data before submitting to EGAT.

<u>ประกาศความเป็นส่วนตัว (Privacy Notice) สำหรับการจัดซื้อจัดจ้าง การบริหารพัสดุ และการบริหารสัญญาของ กฟผ.</u>

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย (กฟผ.) ได้ดำเนินการคุ้มครองข้อมูลส่วนบุคคลสำหรับการจัดซื้อจัดจ้าง การบริหารพัสดุ และการบริหารสัญญา เพื่อให้เป็นไปตาม**พระราชบัญญัติคุ้มครองข้อมูลส่วนบุคคลของประเทศไทย พ.ศ. 2562** (PDPA) ซึ่งมีผลบังคับใช้อย่างครบถ้วน ตั้งแต่วันที่ 1 มิถุนายน 2565 ทั้งนี้ ท่านสามารถศึกษารายละเอียดประกาศความเป็นส่วนตัว (Privacy Notice) สำหรับการจัดซื้อจัดจ้าง การบริหารพัสดุ และการบริหารสัญญา ได้ที่ https://www.egat.co.th/privacy-notice-procurement.html หรือที่ QR Code ด้านล่าง

<u>การขีดฆ่าข้อมูลส่วนบุคคลอ่อนไหว</u>

กฟผ. มีประกาศความเป็นส่วนตัว (Privacy Notice) สำหรับการจัดซื้อจัดจ้าง การบริหารพัสดุ และการบริหารสัญญา เพื่อใช้ในการเก็บรวบรวม ใช้ หรือเปิดเผย ข้อมูลส่วนบุคคล แต่ไม่เก็บข้อมูลส่วนบุคคลอ่อนไหว หากเอกสารของท่านที่ต้องส่งมอบให้ กฟผ. มีข้อมูลส่วนบุคคลอ่อนไหวตามที่ถูกบัญญัติไว้ในมาตรา 26 ของ PDPA ดังนี้ เชื้อชาติ เผ่าพันธุ์ ความคิดเห็นทางการเมือง ความเชื่อในลัทธิ ศาสนาหรือปรัชญา พฤติกรรมทางเพศ ประวัติอาชญากรรม ข้อมูลสุขภาพ ความพิการ ข้อมูลสหภาพแรงงาน ข้อมูลพันธุกรรม ข้อมูลชีวภาพ หรือข้อมูลอื่นใด ซึ่งกระทบต่อเจ้าของข้อมูลส่วนบุคคลในทำนองเดียวกันรวมอยู่ด้วย ขอให้ท่านขีดฆ่า หรือปกปิดข้อมูลดังกล่าว ก่อนส่งมอบให้แก่ กฟผ.

Notice to Bidder

Subject : Online Payment for Purchase of Bidding Documents

Please be informed of the online payment for purchase of bidding documents as follows:

1) Fill-out the Registration Form and upload the proof of payment via the link provided in https://www4.egat.co.th/fprocurement/biddingeng

   Payment shall be made by bank transfer or telegraphic transfer to EGAT's 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.

2) The registration will be deemed complete only upon successful processing of the payment and confirmation of funds received.

3) After the payment has been verified for approximately 3 working days, the in-charge officer will send the link for downloading the bidding documents together with the receipt to the purchaser's email address in the Registration Form.

****

ประกาศการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย *(ฉบับแก้ไข ครั้งที่ 2)*

เรื่อง ประกวดราคาจ้าง เลขที่ TIEC-S-11

ประกวดราคา 2 ซอง

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย (กฟผ.) มีความประสงค์จะจัดซื้อและจ้างก่อสร้าง Static Synchronous Compensator ที่สถานีไฟฟ้าแรงสูง 230 kV ชัยภูมิ 2 สำหรับโครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคตะวันออกเฉียงเหนือ ภาคเหนือตอนล่าง ภาคกลางและกรุงเทพมหานคร เพื่อเสริมความมั่นคงระบบไฟฟ้า โดยทำสัญญาแบบปรับราคาได้ (ค่า k) โดยใช้งบประมาณ กฟผ.

สถานที่ก่อสร้าง : สถานีไฟฟ้าแรงสูง 230 kV ชัยภูมิ 2

ราคากลาง (รวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ) : 1,720,000,000.- บาท

คุณสมบัติของผู้เสนอราคา

1. ต้องเป็นนิติบุคคลผู้มีอาชีพรับจ้างตามประกวดราคาจ้างดังกล่าว และต้องไม่เป็นผู้ทิ้งงานซึ่งปลัดกระทรวงการคลังได้แจ้งเวียนชื่อไว้ หรือต้องไม่เป็นผู้ที่ กฟผ. ห้ามติดต่อหรือห้ามเข้าเสนอราคา หรือต้องไม่เป็นผู้ที่ได้รับผลของการสั่งให้นิติบุคคลหรือบุคคลอื่นเป็นผู้ทิ้งงานตามคำสั่ง กฟผ.
2. ต้องไม่เป็นผู้มีผลประโยชน์ร่วมกันกับผู้เสนอราคารายอื่น ณ วันประกาศประกวดราคาครั้งนี้เป็นต้นไป หรือต้องไม่เป็นผู้กระทำการอันเป็นการขัดขวางการแข่งขันราคาอย่างเป็นธรรมในการดำเนินการประกวดราคาครั้งนี้
3. ต้องไม่เป็นที่ปรึกษาของ กฟผ. หรือมีส่วนร่วมในบริษัทที่ปรึกษาของ กฟผ. ในงานนี้ หรือต้องไม่มีผู้ปฏิบัติงาน กฟผ. เข้าไปมีส่วนร่วมในกิจการของผู้เสนอราคา ไม่ว่าจะในฐานะผู้ถือหุ้นที่มีสิทธิควบคุมการจัดการ กรรมการ ผู้อำนวยการ ผู้จัดการ พนักงาน ลูกจ้าง ตัวแทน หรือที่ปรึกษา ยกเว้น ในกรณีที่ผู้ปฏิบัติงานได้รับคำสั่งอย่างเป็นทางการจาก กฟผ. ให้ไปปฏิบัติงานหรือเข้าร่วมในกิจการของผู้เสนอราคา
4. ต้องไม่เป็นผู้ได้รับเอกสิทธิ์หรือความคุ้มกัน ซึ่งอาจปฏิเสธไม่ยอมขึ้นศาลไทย เว้นแต่รัฐบาลของผู้เสนอราคาได้มีคำสั่งให้สละสิทธิ์และความคุ้มกันเช่นว่านั้น
5. ผู้ประสงค์เข้าประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม (Joint Venture or Consortium) จะต้องดำเนินการทุกขั้นตอนของการประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม ตั้งแต่การเสนอราคาจนสิ้นสุดข้อผูกพันกับ กฟผ.
6. สำหรับการจัดซื้อจัดจ้างที่มีวงเงินเกิน 300 ล้านบาทขึ้นไป ผู้เสนอราคาต้องจัดให้มีมาตรฐานขั้นต่ำของนโยบายและแนวทางป้องกันการทุจริตในการจัดซื้อจัดจ้างที่เหมาะสม โดยมาตรฐานขั้นต่ำของนโยบายและแนวทางป้องกันการทุจริตในการจัดซื้อจัดจ้างดังกล่าวต้องจัดทำเป็นลายลักษณ์อักษรและมีรายละเอียดครบถ้วนตามที่คณะกรรมการความร่วมมือป้องกันการทุจริตประกาศกำหนด

การขายเอกสารประกวดราคา

ผู้สนใจติดต่อซื้อเอกสารประกวดราคา ในราคาชุดละ 15,000.- บาท ในวันทำการระหว่างเวลา 08:00 น. ถึง 15:00 น. ตั้งแต่วันที่ 2 กรกฎาคม 2569 ถึงวันที่ 14 สิงหาคม 2569 ทั้งนี้ สามารถดูรายละเอียดการซื้อเอกสารประกวดราคาได้ที่เว็บไซต์ https://www4.egat.co.th/fprocurement/biddingeng หรือสอบถามข้อมูลเพิ่มเติมได้ทางโทรศัพท์ หมายเลข 0 2436 3346 หรืออีเมล procurement.tse@egat.co.th

<u>การยื่นซองประกวดราคา</u>

กำหนดยื่นซองข้อเสนอด้านเทคนิคพร้อมซองราคา เลื่อนจากวันที่ 29 กันยายน 2569 เป็นวันที่ 12 พฤศจิกายน 2569 เวลา 09:00 น. ถึง 10:00 น. และเปิดซองข้อเสนอด้านเทคนิคเวลา 10:00 น. ณ ห้องประกวดราคา ชั้น 1 อาคาร ท.137 การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เชิงสะพานพระราม 7 จังหวัดนนทบุรี

ประกาศแก้ไข ณ วันที่ ***16 ตุลาคม 2569***

(นางสาววัลลภา ชีวธนากรณ์กุล)

หัวหน้ากองจัดซื้อจัดจ้างสายงานระบบส่ง

Invitation to Bid No. TIEC-S-11 *(Revision 2)*

Supply and Construction of Static Synchronous Compensator at 230 kV Chaiyaphum 2 Substation

Transmission System Improvement Project in Northeastern, Lower Northern, Central Regions and Bangkok Area 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 : 230 kV Chaiyaphum 2 Substation

Medium Cost (including Value Added Tax and other expenses) : THB 1,720,000,000.-

Eligibility of Bidders

1. 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 Permanent Secretary, Ministry of Finance, and/or in the Debarment List and/or in the List of Work Abandoners declared by EGAT.
2. 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.
3. 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.
4. 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.
5. 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.
6. Bidders shall provide written minimum standards of the policy and directions for anti-corruption in relation to procurement together with supporting evidence pursuant to the requirements prescribed by the Anti-Corruption Co-operation Committee.

Availability of Bidding Documents

Bidding Documents are available for online purchase during 8:00 hrs. to 15:00 hrs., Bangkok Standard Time, as from July 2, 2026 to August 14, 2026 at USD 500.- or THB 15,000.- per copy, non-refundable.

Please find more details for online purchasing process at https://www4.egat.co.th/fprocurement/biddingeng or contact for further information at telephone no. 66 2436 3346 or procurement.tse@egat.co.th.

Delivery of Bids

Technical and price proposal submission date and Technical proposal opening date is postponed from September 29, 2026 to November 12, 2026. Technical and price proposal shall be submitted at Bidding Room, 1st Floor, Tor 137 Building at EGAT's Head Office, Nonthaburi during 09:00 hrs. to 10:00 hrs., Bangkok Standard Time, and Technical proposal will be opened publicly at 10:00 hrs

ELECTRICITY GENERATING AUTHORITY OF THAILAND

October 16, 2026

Wallapa Chewadhnakorlkul

(Miss Wallapa Chewadhnakorlkul)

Chief, Procurement Department – Transmission System Segment

ตารางแสดงวงเงินงบประมาณที่ได้รับจัดสรรและราคากลาง(ราคาอ้างอิง)

ในการจัดซื้อจัดจ้างที่มิใช่งานก่อสร้าง

1. **ชื่อโครงการ** Bid No. TIEC-S-11

การจัดซื้อและจ้างก่อสร้าง Static Synchronous Compensator

ที่สถานีไฟฟ้าแรงสูง 230 kV ชัยภูมิ 2

โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคตะวันออกเฉียงเหนือ ภาคเหนือตอนล่าง ภาคกลาง และกรุงเทพมหานคร เพื่อเสริมความมั่นคงระบบไฟฟ้า

/หน่วยงานเจ้าของโครงการ ฝ่ายแผนงานและโครงการระบบส่ง การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย

2. **วงเงินงบประมาณที่ได้รับจัดสรร**

โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคตะวันออกเฉียงเหนือ ภาคเหนือตอนล่าง ภาคกลาง และกรุงเทพมหานคร เพื่อเสริมความมั่นคงระบบไฟฟ้า งบประมาณ 94,040 ล้านบาท

3. **วันที่กำหนดราคากลาง** 2 กุมภาพันธ์ 2569 (วันที่ รวร. อนุมัติ)

ราคารวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ เป็นเงิน 1,720,000,000.00 บาท **ราคา/หน่วย** ตามเอกสารแนบ

4. **แหล่งที่มาของราคากลาง**

หลักเกณฑ์การกำหนดราคากลางการจัดซื้อและจัดจ้างงานก่อสร้างระบบส่งไฟฟ้าของสายงานพัฒนาระบบส่ง

5. **รายชื่อเจ้าหน้าที่ผู้กำหนดราคากลาง**

5.1 นายณัฏฐ์	วงศ์เทพวาณิชย์	หมฟ-ร. กวอ-ร.
5.2 นายชิตพล	จินต์อัจฉริยกุล	หวอ-ร. กวอ-ร.
5.3 นางสาวจารุวรรณ	พิพัฒน์มงคลพร	หอต-ร. กวอ-ร.
5.4 นายรุหาญ	รุจิธัญธาร	กวป-ร.
5.5 นายมณเฑียร	จำปาอ่อน	กวธ-ร.

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

MEDIUM COST FOR BID NO. TIEC-S-11

SUMMARY OF BID PRICE

SUPPLY AND CONSTRUCTION OF STATIC SYNCHRONOUS COMPENSATOR AT 230 KV CHAIYAPHUM 2 SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

SCOPE OF WORK :

DESCRIPTION	**PRICE (INCLUDING OTHER EXPENSE and VAT) BAHT**
SCHEDULE 1 : 230 KV CHAIYAPHUM 2 SUBSTATION	28,239,661.60
SCHEDULE 2 : STATIC SYNCHRONOUS COMPENSATOR (STATCOM)	1,687,380,000.00
TOTAL MEDIUM COST	**1,715,619,661.60**
TOTAL MEDIUM COST (ROUND)	**1,720,000,000.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

SUMMARY OF BID PRICE

SUPPLY AND CONSTRUCTION OF STATIC SYNCHRONOUS COMPENSATOR AT 230 KV CHAIYAPHUM 2 SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA 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 CHAIYAPHUM 2 SUBSTATION	THB	2,022,645.90				
				8,282,584.02	12,917,988.19	14,486.00	3,151,856.54
BID PRICE		THB	2,022,645.90	Baht 8,282,584.02	Baht 12,917,988.19	Baht 14,486.00	Baht 3,151,856.54
OTHER EXPENSES		THB	40,452.92	Baht	Baht	Baht	Baht
VAT			144,416.92	Baht 579,780.88	Baht 904,259.17	Baht 1,014.02	Baht 220,629.96
SUMMARY OF BID PRICE		THB	2,167,062.82	Baht 8,862,364.90	Baht 13,822,247.36	Baht 15,500.02	Baht 3,372,486.50
TOTAL MEDIUM COST FOR SCHEDULE 1		THB	28,239,661.60				

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

SCHEDULE 1 : 230 KV CHAIYAPHUM 2 SUBSTATION

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA 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 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	2,022,645.90	8,028,742.02			3,151,856.54
PART 1C : CIVIL WORK				12,917,988.19		
PART 1D : SUPPLY OF SPARE PARTS			253,842.00		14,486.00	
TOTAL PRICE	**THB**	**2,022,645.90**	**Baht** **8,282,584.02**	**Baht** **12,917,988.19**	**Baht** **14,486.00**	**Baht** **3,151,856.54**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA 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 1AB4 : Surge Arrester	THB	441,233.10	84,882.00	78,917.27
Schedule 1AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	942,387.60	115,244.60	158,644.83
Schedule 1AB10 : Disconnecting Switch	THB	474,832.60	101,050.00	86,382.39
Schedule 1AB12 : AC&DC Distribution Board and Termination Box			507,791.92	76,168.79
Schedule 1AB14 : Substation Steel Structure			1,612,760.00	604,785.00
Schedule 1AB15 : Insulator				28,083.83

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA 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 1AB18 : Low Voltage Cable and Conductor			3,561,926.50	1,335,722.44
Schedule 1AB19 : Switchyard Lighting Fixtures			632,779.40	237,292.28
Schedule 1AB20 : Aluminum Tube, Connector and Miscellaneous Hardware			53,951.70	20,231.89
Schedule 1AB21 : Bus Fitting	THB	71,572.60		26,839.73
Schedule 1AB22 : Grounding Material	THB	83,067.60	60,392.20	53,797.43

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA 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 1AB23 : Substation Miscellaneous	THB	9,552.40	38,342.70	17,960.66
Schedule 1AB24 : Control and Protection System			1,259,621.00	319,680.00
Schedule 1AB25 : Fault Recording System				54,450.00
Schedule 1AB38 : Remote Terminal Unit				52,900.00

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA 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 1AB39 : Commissioning				
PART 1AB	**THB**	**2,022,645.90**	**Baht** **8,028,742.02**	**Baht** **3,151,856.54**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

PART 1C : CIVIL WORK

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Description	**Local Currency** (excluding VAT) Baht Amount
Schedule 1C1 : Foundation Work	1,517,381.00
Schedule 1C2 : Cable Trench	2,347,817.40
Schedule 1C4 : Earth Work, Road and Crushed Rock Surfacing	1,661,044.80
Schedule 1C6 : Drainage System	4,682,730.80
Schedule 1C7 : Special Construction Works	1,308,295.19
Schedule 1C8 : Miscellaneous	1,400,719.00
PART 1C	**Baht** **12,917,988.19**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

PART 1D : SUPPLY OF SPARE PARTS

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

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 1D24 : Spare Parts for Control and Protection System			253,842.00	14,486.00
PART 1D			**Baht 253,842.00**	**Baht 14,486.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

SUMMARY OF BID PRICE

SUPPLY AND CONSTRUCTION OF STATIC SYNCHRONOUS COMPENSATOR AT 230 KV CHAIYAPHUM 2 SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

SCHEDULE 2 : STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

SCOPE OF WORK :

DESCRIPTION	**PRICE (INCLUDING OTHER EXPENSE and VAT) BAHT**
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	1,687,380,000.00
PART 2C : CIVIL WORK	INCLUDED
PART 2D : SUPPLY OF SPARE PARTS	INCLUDED
TOTAL MEDIUM COST FOR SCH.2	**1,687,380,000.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB4 : Surge Arrester

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB4-1	192 kV Surge Arrester as per Ratings and Features RF SA8Y11	3		THB	147,077.70	441,233.10			XXXXX	XXXXX
1AB4-2	Steel Supporting Structure for SA8Y11 (for Item No. 1AB4-1), H=5.50 m. as per EGAT's Dwg. No. ST-LA-8-01 and SD-AB-0-01	3		THB			28,294.00	84,882.00	XXXXX	XXXXX
1AB4-3	Cost of Local Transportation, Construction and Installation for Item No. 1AB4-1 thru 1AB4-2	Lump sum	Lump sum	THB	XXXXX	XXXXX	XXXXX	XXXXX	78,917.27	78,917.27
Total Price for Schedule 1AB4				**THB**		**441,233.10**	**Baht**	**84,882.00**	**Baht**	**78,917.27**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB6-1	230 kV voltage transformer, 950 kV BIL, 230000/√3 : 115/(115/√3) & 115/(115/√3) & 110 V oil filled as per ratings and features RF VT8015	3		THB	314,129.20	942,387.60			XXXXX	XXXXX
1AB6-2	Steel Supporting Structure for VT8015 (for Item No.1AB6-1), H=5.50 m as per Dwg. No. ST-VT-4-01 and SD-AB-0-01	3		THB			24,252.00	72,756.00	XXXXX	XXXXX
1AB6-3	Junction Box type PT14 (for Item No.1AB6-1) as per Dwg. No. TP-E-18.1-3/4, 4/4 and TP-E-18.4	1		THB			42,488.60	42,488.60	XXXXX	XXXXX
1AB6-4	Cost of Local Transportation, Construction and Installation for Item No. 1AB6-1 thru 1AB6-3	Lump sum	Lump sum	THB	XXXXX	XXXXX	XXXXX	XXXXX	158,644.83	158,644.83
Total Price for Schedule 1AB6				**THB**		**942,387.60**	**Baht**	**115,244.60**	**Baht**	**158,644.83**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB10 : Disconnecting Switch

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB10-1	245 kV 4000A air switch (high creepage) manually gang operated as per Ratings and Features RF DS89BH(IEC) (Phase spacing = 3.5 m)	1		THB	474,832.60	474,832.60			XXXXX	XXXXX
1AB10-2	Steel Supporting Structure for DS89BH(IEC) as per EGAT's Dwg. No. ST-DS-4-01 and SD-AB-0-01, H = 6.00 m.	1					101,050.00	101,050.00	XXXXX	XXXXX
1AB10-3	Cost of Local Transportation, Construction and Installation for Item No. 1AB10-1 thru 1AB10-2	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	86,382.39	86,382.39
Total Price for Schedule 1AB10				**THB**		**474,832.60**	**Baht**	**101,050.00**	**Baht**	**86,382.39**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB12 : AC&DC Distribution Board and Termination Box

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB12-1	Common cubicle for maintenance type 1 as per Dwg. No. SE-CCM-0-01	1					73,453.60	73,453.60	XXXXX	XXXXX
1AB12-2	Outdoor Receptacle Box type ORB1 as per Dwg. No. SE-ORB-0-01	1					54,809.33	54,809.33	XXXXX	XXXXX
1AB12-3	Outdoor Receptacle Box type ORB2 as per Dwg. No. SE-ORB-0-01	1					75,473.93	75,473.93	XXXXX	XXXXX
1AB12-4	Termination Box type TB1 as per Dwg No. LT-TB-0-01	8					6,628.97	53,031.76	XXXXX	XXXXX
1AB12-5	400/230 Vac Distribution Board as per Dwg. No. TP-E-4.4 (For Control Room, installed in 230 kV GIS Building, designed by Contractor)	1					251,023.30	251,023.30	XXXXX	XXXXX
1AB12-6	Cost of Local Transportation, Construction and Installation for Item No. 1AB12-1 thru 1AB12-5	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	76,168.79	76,168.79
Total Price for Schedule 1AB12							**Baht**	**507,791.92**	**Baht**	**76,168.79**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1AB14 : Substation Steel Structure

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB14-1	230 kV take-off structure (TS801) as per Dwg. No. ST-TS-8-01	4					293,450.00	1,173,800.00	XXXXX	XXXXX
1AB14-2	230 kV beam (BB801) as per Dwg. No. ST-BB-8-01	2					126,919.00	253,838.00	XXXXX	XXXXX
1AB14-3	22 kV bus support structure (BS203) as per Dwg. No. ST-BS-2-03	2					68,310.00	136,620.00	XXXXX	XXXXX
1AB14-4	Junction box support structure (JB001) as per Dwg. No. ST-JB-0-01 (For Safety Switch)	2					8,892.00	17,784.00	XXXXX	XXXXX
1AB14-5	Junction box support structure (JB003) as per Dwg. No. ST-JB-0-03 (For CCM and ORB)	3					6,871.00	20,613.00	XXXXX	XXXXX
1AB14-6	Disconnecting switch operating platform (OP002) as per Dwg. No. ST-OP-0-02	1					10,105.00	10,105.00	XXXXX	XXXXX
1AB14-7	Cost of Local Transportation, Construction and Installation for Item No. 1AB14-1 thru 1AB14-6	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	604,785.00	604,785.00
Total Price for Schedule 1AB14							**Baht**	**1,612,760.00**	**Baht**	**604,785.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB15 : Insulator

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB15-1	Suspension insulator fog type (17" minimum leakage distance and 18,000 lb minimum combined M&E strength) as per Specification attached	Lump sum	Lump sum		Supplied by EGAT	Supplied by EGAT	Supplied by EGAT	Supplied by EGAT	XXXXX	XXXXX
1AB15-2	230 kV station post insulator ANSI TR. No. 308, high creepage distance of not less than 6,050 mm. as per Specification attached	Lump sum	Lump sum		Supplied by EGAT	Supplied by EGAT	Supplied by EGAT	Supplied by EGAT	XXXXX	XXXXX
1AB15-3	Cost of Local Transportation, Construction and Installation for Item No. 1AB15-1 thru 1AB15-2	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	28,083.83	28,083.83
Total Price for Schedule 1AB15							**Baht**		**Baht**	**28,083.83**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1AB18 : Low Voltage Cable and Conductor

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB18-1	750 V power cable as per Specification attached	Lump sum	Lump sum				265,430.00	265,430.00	XXXXX	XXXXX
1AB18-2	600 V control cable with PVC insulation as per Specification attached	Lump sum	Lump sum				2,750,000.00	2,750,000.00	XXXXX	XXXXX
1AB18-3	Annealed copper ground wire as per Specification attached	Lump sum	Lump sum				480,344.70	480,344.70	XXXXX	XXXXX
1AB18-4	Overhead ground wire as per Specification attached	Lump sum	Lump sum				3,828.00	3,828.00	XXXXX	XXXXX
1AB18-5	Aluminum conductor as per Specification attached	Lump sum	Lump sum				62,323.80	62,323.80	XXXXX	XXXXX
1AB18-6	Cost of Local Transportation, Construction and Installation for Item No. 1AB18-1 thru 1AB18-5	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	1,335,722.44	1,335,722.44
Total Price for Schedule 1AB18							**Baht**	**3,561,926.50**	**Baht**	**1,335,722.44**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1AB19 : Switchyard Lighting Fixtures

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB19-1	Flood lighting fixture, LED lamp, 10000 lumen, wide-beam, complete with control gear as per Specification attached	16					10,568.80	169,100.80	XXXXX	XXXXX
1AB19-2	Solar lighting fixture for fence and access road, LED, All in one type as per Ratings and Features RF LX01L1 and Dwg. No. LT-FX-0-03	14					13,390.30	187,464.20	XXXXX	XXXXX
1AB19-3	Tapered galvanized steel lamp post H = 4500 mm. complete with anchor bolts as per Dwg. No. ST-LP-0-03 and SD-AB-0-01	14					19,729.60	276,214.40	XXXXX	XXXXX
1AB19-4	Cost of Local Transportation, Construction and Installation for Item No. 1AB19-1 thru 1AB19-3	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	237,292.28	237,292.28
Total Price for Schedule 1AB19							**Baht**	**632,779.40**	**Baht**	**237,292.28**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB20 : Aluminum Tube, Connector and Miscellaneous Hardware

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB20-1	Aluminum tube as per Specification attached	Lump sum	Lump sum				26,075.50	26,075.50	XXXXX	XXXXX
1AB20-2	230 kV and below Compression connector as per Specification attached	Lump sum	Lump sum				16,711.20	16,711.20	XXXXX	XXXXX
1AB20-3	230 kV and below Miscellaneous hardware as per Specification attached	Lump sum	Lump sum				11,165.00	11,165.00	XXXXX	XXXXX
1AB20-4	Cost of Local Transportation, Construction and Installation for Item No. 1AB20-1 thru 1AB20-3	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	20,231.89	20,231.89
Total Price for Schedule 1AB20							**Baht**	**53,951.70**	**Baht**	**20,231.89**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1AB21 : Bus Fitting

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB21-1	230 kV and below Bus fitting as per Specification attached	Lump sum	Lump sum	THB	71,572.60	71,572.60			XXXXX	XXXXX
1AB21-2	Cost of Local Transportation, Construction and Installation for Item No. 1AB21-1	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	26,839.73	26,839.73
Total Price for Schedule 1AB21				**THB**	**71,572.60**		**Baht**		**Baht**	**26,839.73**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1AB22 : Grounding Material

SCHEDULE 1 : 230 KV CHAIYAPHUM 2 SUBSTATION

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB22-1	Thermite welding material as per Specification attached	Lump sum	Lump sum				60,392.20	60,392.20	XXXXX	XXXXX
1AB22-2	Grounding hardware as per Specification attached	Lump sum	Lump sum	THB	83,067.60	83,067.60			XXXXX	XXXXX
1AB22-3	Cost of Local Transportation, Construction and Installation for Item No. 1AB22-1 thru 1AB22-2	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	53,797.43	53,797.43
Total Price for Schedule 1AB22				**THB**		**83,067.60**	**Baht**	**60,392.20**	**Baht**	**53,797.43**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB23 : Substation Miscellaneous

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB23-1	Rigid steel conduit as per Specification attached	Lump sum	Lump sum				16,342.70	16,342.70	XXXXX	XXXXX
1AB23-2	Fitting for rigid steel conduit as per Specification attached	Lump sum	Lump sum	THB	9,552.40	9,552.40			XXXXX	XXXXX
1AB23-3	Identification and danger notice plate as per drawing attached	Lump sum	Lump sum				22,000.00	22,000.00	XXXXX	XXXXX
1AB23-4	Cost of Local Transportation, Construction and Installation for Item No. 1AB23-1 thru 1AB23-3	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	17,960.66	17,960.66
Total Price for Schedule 1AB23				**THB**		**9,552.40**	**Baht**	**38,342.70**	**Baht**	**17,960.66**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB24 : Control and Protection System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	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			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB24-1	230 kV LINE STUB PROTECTION (1-51S/51SG, 2-BF)	Panel no. 214R, to be installed at 230 kV GIS building. Specification no. 1002. DWG. Nos. CYP2-E-1.2, CYP2-E-2.2, CYP2-E-3.2 and TP-E-10.1. Scope of work.	1	EA				1,054,545.00	1,054,545.00	XXXXX	XXXXX
1AB24-2	WATT AND VAR TRANSDUCER (W&VAR-TDR)	VAR-TDR (3-phase type), to be installed at the existing transducer panel. Specification no. 1002. DWG. No. TP-E-21.1. Scope of work.	1	EA				37,528.00	37,528.00	XXXXX	XXXXX

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB24 : Control and Protection System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	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			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB24-3	CURRENT TRANSDUCER (A-TDR 3 PH)	3-phase type, to be installed at the existing transducer panel. Specification no. 1002. DWG. No. TP-E-21.1. Scope of work.	1	EA				43,092.00	43,092.00	XXXXX	XXXXX
1AB24-4	VOLTAGE TRANSDUCER (V-TDR 3 PH)	3-phase type, to be installed at the existing transducer panel. Specification no. 1002. Selectable 115 & 66.4 V for voltage input. DWG. No. TP-E-21.1. Scope of work.	1	EA				43,092.00	43,092.00	XXXXX	XXXXX
1AB24-5	TEMPERATURE TRANSDUCER (T-TDR)	To be installed at the existing transducer panel. Specification no. 1002. DWG. No. TP-E-21.1. Scope of work.	1	EA				45,360.00	45,360.00	XXXXX	XXXXX

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB24 : Control and Protection System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	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			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB24-6	TEST SWITCH (FOR METERING)	Used for VAR-TDR, to be installed at the existing transducer panel. Specification no. 1002. Scope of work.	1	EA				29,955.00	29,955.00	XXXXX	XXXXX
1AB24-7	MCB, 0.5A, 3 POLE FOR PT	Used for V-TDR, to be installed at the existing transducer panel. Specification no. 1002. Scope of work.	1	EA				2,462.00	2,462.00	XXXXX	XXXXX
1AB24-8	MCB, 6A, 2 POLE FOR DC SUPPLY	Used for DC supply for TDR, to be installed at the existing transducer panel. Specification no. 1002. Scope of work.	1	EA				3,587.00	3,587.00	XXXXX	XXXXX

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB24 : Control and Protection System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	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			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB24-9	MODIFICATION TO THE EXISTING CONTROL AND PROTECTION SYSTEM	DWG. nos. CYP2-E-1.2, CYP2-E-2.2, CYP2-E-3.2 and TP-E-21.1. Scope of work.	Lump Sum	Lump Sum		XXXXX	XXXXX	XXXXX	XXXXX	166,900.00	166,900.00
1AB24-10	COST OF LOCAL TRANSPORTATION, CONSTRUCTION AND INSTALLATION FOR ITEM NOS. 1AB24-1 THRU 1AB24-8	Scope of work.	Lump Sum	Lump Sum		XXXXX	XXXXX	XXXXX	XXXXX	152,780.00	152,780.00
Total Price for Schedule 1AB24								**Baht**	**1,259,621.00**	**Baht**	**319,680.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB25 : Fault Recording System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	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			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB25-1	MODIFICATION TO THE EXISTING FAULT RECORDING SYSTEM	DWG. nos. CYP2-E-1.2, CYP2-E-2.2, CYP2-E-3.2 and TP-E-21.1. Scope of work.	Lump Sum	Lump Sum		XXXXX	XXXXX	XXXXX	XXXXX	54,450.00	54,450.00
Total Price for Schedule 1AB25								**Baht**		**Baht**	**54,450.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB38 : Remote Terminal Unit

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	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			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB38-1	MODIFICATION TO THE EXISTING COMPUTERIZED SUBSTATION CONTROL SYSTEM	DWG. nos. CYP2-E-1.2, CYP2-E-2.2, CYP2-E-3.2 and TP-E-21.1. Scope of work.	Lump Sum	Lump Sum		XXXXX	XXXXX	XXXXX	XXXXX	52,900.00	52,900.00
Total Price for Schedule 1AB38								**Baht**		**Baht**	**52,900.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1AB39 : Commissioning

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	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			
					Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1AB39-1	Commissioning	Lump sum	Lump sum		XXXXX	XXXXX	XXXXX	XXXXX	included in 2AB39	included in 2AB39
Total Price for Schedule 1AB39							**Baht**		**Baht**	

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1C1 : Foundation Work

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C1-1	230 kV Take off Structure Foundation (TS801) Pile Type	FD-TS-8-05 01/01	4	set	117,813.00	471,252.00
1C1-2	230 kV Disconnecting Switch Support foundation (DS802) Pile Type	FD-DS-8-04 01/01	1	set	40,688.00	40,688.00
1C1-3	22 kV Bus support structure foundation (BS201,BS202,BS203,BS204) Pile,Bored Pile Type (BS203 only)	FD-BS-2-03 01/01	2	set	19,868.00	39,736.00
1C1-4	Junction Box Structure foundation (JB001) Pad Type	FD-JB-0-03 01/01	2	set	8,180.00	16,360.00
1C1-5	Junction Box Structure foundation (JB003) Pad Type	FD-JB-0-05 01/01	3	set	6,796.00	20,388.00

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1C1 : Foundation Work

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C1-6	Lamp post for fence and access road lighting foudation (LP3) (LED type) Pad Type & Pile Type (Pile type)	FD-LP-0-05 01/01	14	set	10,322.00	144,508.00
1C1-7	Disconnecting Switch Operating Platform foundation (OP002)	FD-OP-0-02 01/01	1	set	2,728.00	2,728.00
1C1-8	Driven Pile (Driven Pile, Dowel bar are included and pile shoe if require)	SD-PL-0-01	Lump Sum	Lump Sum	752,013.00	752,013.00
1C1-9	Bored Pile (Bored Pile, Dowel bar are included)	SD-PL-0-02	Lump Sum	Lump Sum	29,708.00	29,708.00
Total Price for Schedule 1C1					**Baht**	**1,517,381.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

filename : TIEC-S-11-1 (230 kV CYP2)

MEDIUM COST FOR BID NO. TIEC-S-11

1C2 : Cable Trench

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C2-1	Standard cable trench, steel cover included (Type"A")	SD-CE-0-02 01-02/02	Lump Sum	Lump Sum	154,905.00	154,905.00
1C2-2	Cable trench type "A" including steel cover for XLPE system	Designed by Contractor, MTG-CE-0-01 01-02/02, See Scope of work	Lump Sum	Lump Sum	969,656.80	969,656.80
1C2-3	Cable trench type "B" including steel cover for XLPE system	Designed by Contractor, MTG-CE-0-01 01-02/02, See Scope of work	Lump Sum	Lump Sum	1,223,255.60	1,223,255.60
Total Price for Schedule 1C2					**Baht**	**2,347,817.40**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1C4 : Earth Work, Road and Crushed Rock Surfacing

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C4-1	Crushed rock surfacing 0.10 m thickness	See Dwg. No. CYP2-C-1	Lump Sum	Lump Sum	319,780.00	319,780.00
1C4-2	Transformer loading	SD-RD-0-03 01/01	Lump Sum	Lump Sum	50,120.80	50,120.80
1C4-3	Transformer loading (Existing to be removed)	SD-RD-0-03 01/01	Lump Sum	Lump Sum	7,904.00	7,904.00
1C4-4	RC.Road type " E " section 4 - 4	SD-RD-0-01 01-02/02	Lump Sum	Lump Sum	1,276,740.00	1,276,740.00
1C4-5	Existing Rc.Road (To be removed)	SD-RD-0-01 01-02/02	Lump Sum	Lump Sum	6,500.00	6,500.00
Total Price for Schedule 1C4					**Baht**	**1,661,044.80**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1C6 : Drainage System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C6-1	Drainage System	Designed by Contractor, See Dwg. No. CYP2-C-6, See Scope of work	Lump Sum	Lump Sum	4,649,382.80	4,649,382.80
1C6-2	Dia. 0.15m PVC. Pipe (Class 8.5)		Lump Sum	Lump Sum	4,400.00	4,400.00
1C6-3	Existing gutter to be removed	SD-RD-0-01 01-02/02	Lump Sum	Lump Sum	6,868.00	6,868.00
1C6-4	Existing reinforced concrete pipe to be removed	WD-DN-0-01 01/01	Lump Sum	Lump Sum	22,080.00	22,080.00
Total Price for Schedule 1C6					**Baht**	**4,682,730.80**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1C7 : Special Construction Works

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C7-1	64 sq.m Site office	See Scope of work	1	set	798,846.00	798,846.00
1C7-2	Architectural and Civil engineering design work		Lump Sum	Lump Sum	444,749.19	444,749.19
1C7-3	Plate bearing test		1	set	6,500.00	6,500.00
1C7-4	Dynamic Pile load test		Lump Sum	Lump Sum	57,000.00	57,000.00
1C7-5	Seismic integrity test (all bored pile)		Lump Sum	Lump Sum	1,200.00	1,200.00
Total Price for Schedule 1C7					**Baht**	**1,308,295.19**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1C8 : Miscellaneous

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	**Local Currency** (excluding VAT) Baht	
					Unit Price	Amount
1C8-1	Wire mesh fence (with Piling work)	SD-CF-0-01 01-02/02, See Dwg. No. CYP2-C-1	Lump Sum	Lump Sum	1,367,350.00	1,367,350.00
1C8-2	Wire mesh fence (existing to be removed)	SD-CF-0-01 01-02/02, See Dwg. No. CYP2-C-1	Lump Sum	Lump Sum	33,369.00	33,369.00
Total Price for Schedule 1C8					**Baht**	**1,400,719.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

MEDIUM COST FOR BID NO. TIEC-S-11

1D24 : Spare Parts for Control and Protection System

SUPPLY, CONSTRUCTION AND MODIFICATION WORK FOR CONNECTION BETWEEN THE EXISTING CHAIYAPHUM 2 SUBSTATION AND THE NEW STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

Item No.	Description	Drawing No. / Reference No.	Qty.	Unit	Currency	**Supply of Equipment**				**Local Transportation** (excluding VAT) Baht	
						Foreign Supply		Local Supply			
						CIF Thai Port		Ex-works Price (excluding VAT) Baht			
						Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1D24-1	TRANSFORMER OVERCURRENT RELAY (51T/51TG, 51L/51LG,51/51G,51S/51SG,51C/51CG)	Supply as spare part (same type as supplied for item no. 1AB24-1). 1 A for current input. Specification no. 1002.	1	EA				114,148.00	114,148.00	XXXXX	XXXXX
1D24-2	BREAKER FAILURE RELAY (50BF+62BF)	Supply as spare part (same type as supplied for item no. 1AB24-1). 1 A for current input. Specification no. 1002.	1	EA				139,694.00	139,694.00	XXXXX	XXXXX
1D24-3	COST OF LOCAL TRANSPORTATION FOR ITEM NOS. 1D24-1 THRU 1D24-2	Scope of work.	Lump Sum	Lump Sum		XXXXX	XXXXX	XXXXX	XXXXX	14,486.00	14,486.00
Total Price for Schedule 1D24								**Baht**	**253,842.00**	**Baht**	**14,486.00**

นายสมชัย เจริญศรีเกษม
ผู้อำนวยการฝ่ายวิศวกรรมระบบส่ง
02 Feb 2026

Important Information

for

Invitation to Bid No. TIEC-S-11

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-3. <u>Eligibility of Bidders: General Requirements</u>

According to the Notification of the Anti-Corruption Co-operation Committee Concerning Minimum Standards of the Policy and Directions for Anti-Corruption in Relation to Procurement Required to be put in place by the Business Operator, in accordance with Section 19 of the Public Procurement and Supplies Administration Act, B.E. 2560 (A.D. 2017), the article has been revised as per Data Sheet.

Article A-6. <u>Preparation and Delivery of Bids</u> and Article B-1. <u>Preparation of Bids</u>

Details on how to prepare the proposal have been revised. Bids shall be prepared in accordance with the Instructions to Bidders contained in the Bidding Documents in one (1) original hard copy and one (1) electronic copy contained in USB flash drive.

Article A-6. <u>Preparation and Delivery of Bids</u>

Details of technical proposal opening time and place shall be specified in the Tentative Schedule.

Article A-7. <u>Availability of Bidding Documents</u>

Availability of Bidding Documents has been changed from CD-ROM to electronic files for download via link provided by EGAT.

Channel of Documents Submission

For channel of document submission in the hereunder Articles, facsimile and telex has been replaced with letters submitted electronically or electronic mails (E-mails).

- B-1. Preparation of Bids

- B-4. Validity of Bids

- D-9. Notices

- E-20. Documents Required for Each Shipment

- F-11. Payment

Section B : Overview of the Procurement Process

The procurement process diagram has been updated**.**

Article B-2. Bid Prices

For Source of Supply and Service 1. Prices for Equipment, Prices for Equipment manufactured outside Thailand (imported Equipment), shall be firm CIF Thai Port basis and quoted in Thai baht, US dollar, euro, Japanese yen, renminbi (Chinese yuan), or in the Bidder's or Manufacturer's home currency only if his currency trading is prevailed at the time of bidding in any international market other than in Bidder's or Manufacturer's home country.

Article B-8. Information to be Submitted with Bid

According to the Notification of the Anti-Corruption Co-operation Committee Concerning Minimum Standards of the Policy and Directions for Anti-Corruption in Relation to Procurement Required to be put in place by the Business Operator, in accordance with Section 19 of the Public Procurement and Supplies Administration Act, B.E. 2560 (A.D. 2017), the article has been revised as per Data Sheet.

Article E-19. Shipment

The Maritime Promotion Bureau has been updated to the Maritime Promotion Division and its contact information has also been updated.

Article F-11. <u>Payment</u>

After each payment is made, the Contractor or beneficiary shall issue and submit the receipt to EGAT as detailed in the paragraph added at the end of this article.

According to the Notification of the Anti-Corruption Co-operation Committee Concerning Minimum Standards of the Policy and Directions for Anti-Corruption in Relation to Procurement Required to be put in place by the Business Operator, in accordance with Section 19 of the Public Procurement and Supplies Administration Act, B.E. 2560 (A.D. 2017), the article has been revised as per Data Sheet.

G-3. <u>Contractor's Office and Other Construction Facilities</u>

Details of vehicles and relevant conditions to be provided by the Contractor for inspection of the work have been added at the end of this article.

DATA SHEET

for

Invitation to Bid No. TIEC-S-11

(Two-envelope)

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

Article A-3. Eligibility of Bidders: General Requirements

The following requirement shall be added to Article A-3. Eligibility of Bidders: General Requirements, item I.:

j. Bidders shall provide written minimum standards of the policy and directions for anti-corruption in relation to procurement together with supporting evidence pursuant to the Notification of the Anti-Corruption Co-operation Committee Concerning Minimum Standards of the Policy and Directions for Anti-Corruption in Relation to Procurement Required to be put in place by the Business Operator, in accordance with Section 19 of the Public Procurement and Supplies Administration Act, B.E. 2560 (A.D. 2017).

Article B-3. Bid Security

The amount of bid security shall be USD 2,788,950.- or THB 90,630,000.-.

Article B-4. Validity of Bids

The validity of the bid shall be for three hundred (300) Days from the date specified for opening of technical proposals.

Article B-8. Information to be Submitted with Bid

The following document shall be added to Article B-8. Information to be Submitted with Bid:

s. Bidder's minimum standards of the policy and directions for anti-corruption in relation to procurement, together with the completely filled out Anti-Corruption Compliance Checklist as provided, and supporting evidence.

Where the Bidder holding a certification under ISO 37001 Anti-Bribery Management Systems, certification from the Thai Private Sector Collective Action against Corruption (CAC Certified), or any certification as prescribed by the Anti-Corruption Co-operation Committee, shall be deemed to have satisfied the minimum standards of the policy and directions for anti-corruption in relation to procurement. Such certification documents may be submitted as part of the bid.

Such minimum standards of the policy and directions for anti-corruption in relation to procurement, or the certification, shall remain valid and effective from the technical proposal opening date.

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

If the Contractor fails to meet any of the completion dates for Schedule 1 : 230 kV Chaiyaphum 2 Substation or Schedule 2 : Static Synchronous Compensator (STATCOM), the liquidated damages shall be at the rate of one-tenth of one (0.10) per cent of the total Contract Price for Schedule 1 : 230 kV Chaiyaphum 2 Substation and Schedule 2 : Static Synchronous Compensator (STATCOM) for each Day of delay. This sum is payable regardless of the actual loss and/or damages incurred.

Maintenance Guarantee Period

For 230 kV Substation, 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 230 kV Static Synchronous Compensator (STATCOM), the Contractor shall guarantee as follows:

- The proper functioning of the Work for a period of three (3) Years except Power Transformer of STATCOM for a period of five (5) Years. The guarantee period will start after 2 months burn-in period.
- The availability warranty for a period of three (3) Years. The evaluation of availability of 230 kV STATCOM will start after 2 months burn-in period. The burn-in period will start after the first energization. During this burn-in period the availability will not be counted. If the availability of 230 kV STATCOM could not be fulfilled during the guarantee period, the guarantee period shall be extended as specified in Maintenance Guarantee in section F.
- Completion date will be on the first energization.

Defective Equipment to be replaced with the whole new set

For Power Transformer of STATCOM, in case EGAT, at its sole discretion, requires the Contractor to replace any defected Equipment, the Contractor shall replace the Equipment with the whole new set as specified in Failure to Meet Requirements in section E and Maintenance Guarantee in section F.

Article F-11. Payment

The following paragraphs shall be added as the last two paragraphs of this article:

" Please note that the Contractor shall provide written minimum standards of the policy and directions for anti-corruption in relation to procurement or a certification of anti-corruption standards that are valid until the date of receipt of the final payment under the Contract.

In the case where EGAT finds that the validity period of the Contractor's submitted minimum standards of the policy and directions for anti-corruption in relation to procurement, or the relevant certification, will expire before the date of receipt of the final payment under the Contract, EGAT shall issue a written notification to the Contractor requiring the submission of a revised or updated, completely filled out Anti-Corruption Compliance Checklist together with supporting evidence, prior to the expiration date of the existing Anti-Corruption Compliance Checklist. "

Article G-3. Contractor's Office and Other Construction Facilities

The provision regarding vehicles for EGAT's inspection under this article shall not be applicable. All other terms and conditions specified in this article shall remain applicable.

Anti-Corruption Compliance Checklist **(Rev.1)**

Bidders shall provide written minimum standards of the policy and directions for anti-corruption in relation to procurement ("Minimum Standards") together with supporting evidence pursuant to the Notification of the Anti-Corruption Co-operation Committee Concerning Minimum Standards of the Policy and Directions for Anti-Corruption in Relation to Procurement Required to be put in place by the Business Operator, in accordance with Section 19 of the Public Procurement and Supplies Administration Act, B.E. 2560 (A.D. 2017). This checklist shall be submitted with Bids.

Project: (Please specify the project for which you are bidding) .....

State Agency: Electricity Generating Authority of Thailand

Bidder Name: (Please specify the bidder's name) .....

Please mark ✓ one of the following boxes ☐ that applies to the bidders* and complete all details in the space provided:

☐ 1. Have one of the following certificates:

○ Certificate under ISO 37001 Anti-Bribery Management Systems, or

○ Certificate from the Thai Private Sector Collective Action against Corruption, or

○ Certificate as prescribed by the Anti-Corruption Co-operation Committee: (Please specify the certificate name)

Validity period: ..... (Please specify the validity period of the chosen certificate) .....

Please attach an evidence of the chosen certificate.

☐ 2. Do not have a certificate as specified in item 1, but have the Minimum Standards with one of the following validity:

○ Perpetual Validity, or

○ Validity period: ..... (Please specify the validity period of the Minimum Standards) .....

Details of the Minimum Standards and supporting evidence are as follows: (Please mark ✓ in the "Yes" or "No" column):

Item	Yes	No	Reference Evidence (Please specify Article)
1. Bidders have any clearly defined written anti-corruption policies that is regularly updated.			
2. Bidders have any clearly defined written guidelines, methods, or measures for preventing corruption in procurement that is regularly updated, including but not limited to:			
2.1 Code of Conduct			
2.2 Internal unit or personnel explicitly responsible for the prevention of corruption			
2.3 Penalties or regulations against corruption			
2.4 Channels or systems to report any suspicious or queries related to corruption			
2.5 Anti-corruption training plan			
3. Bidders have communicated and publicized the anti-corruption policies and guidelines relation to procurement as stated in items 1 and 2.			
4. Bidders have provided training on anti-corruption to directors, executives, or employees.			
5. The anti-corruption policies and guidelines are reviewed at least every three (3) years.			

We hereby certify that the information provided above and the supporting evidence are true and correct.

Signed .....

(.....)

Name of Bidder

Stamp company seal (if any)

Date.....

* Notes:

1. The certificate or Minimum Standards shall remain valid and effective from the technical proposal opening date until the date of receipt of the final payment under the contract.
2. If the bidders do not have a certificate, the bidders shall fulfill all items stipulated in the above table to meet the Eligibility of Bidders' criteria for participation in this procurement.
3. In case of Consortium of two (2) or more firms, partnership or companies, this checklist of each member shall be submitted separately.
4. In the case of an unincorporated Joint Venture, each participant shall submit this checklist separately.
5. This checklist is a translation from Thai based on the Notification of the Anti-Corruption Co-operation Committee Concerning Minimum Standards of the Policy and Directions for Anti-Corruption in Relation to Procurement Required to be put in place by the Business Operator, in accordance with Section 19 of the Public Procurement and Supplies Administration Act, B.E. 2560 (A.D. 2017), dated September 25, 2024. In the event of any discrepancy, the Thai version in the notification shall prevail.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

Nonthaburi
Thailand

INVITATION TO BID NO. TIEC-S-11

SUPPLY AND CONSTRUCTION OF STATIC SYNCHRONOUS COMPENSATOR AT 230 kV CHAIYAPHUM 2 SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

(TWO-ENVELOPE)

A-1. Invitation

The Electricity Generating Authority of Thailand (EGAT) hereby invites sealed bids for supply and construction of Static Synchronous Compensator at 230 kV Chaiyaphum 2 Substation under Transmission System Improvement Project in Northeastern, Lower Northern, Central Regions and Bangkok Area to Enhance System Security as described herein in accordance with terms, conditions and Specifications described in these Bidding Documents.

A-2. Work Description

The supply and construction of Static Synchronous Compensator at 230 kV Chaiyaphum 2 Substation 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.

A-3. 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 Permanent Secretary, Ministry of Finance 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 must have purchased the bidding documents from EGAT. For a joint venture or a consortium, only one (1) member of the joint venture or consortium is required to purchase the bidding documents.

In case the Bidder’s name is not exactly the same as the purchaser’s name, the purchaser shall notify EGAT of the name of the Bidder in writing prior to the ***technical proposal*** opening time.

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.

A-4. 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 have one of the following qualifications regarding experiences executing contract of supply and construction substation.

1) Having experience with EGAT in executing at least one (1) contract as contractor (not as subcontractor) for supply and construction of a complete 115 kV or above conventional or GIS substation, with its overall performance satisfactory to EGAT;

2) Having experience in executing at least one (1) contract as contractor (not as subcontractor) for supply and construction of a complete 220 kV or above conventional or GIS substation in an overseas country (not his own country).

Experience record of the Bidder or either member of the joint venture/consortium, including experience record derived from being a member of other joint venture or consortium in previous project(s) is acceptable. It is not allowed to combine the experience records of each member of the joint venture/consortium in order to meet the experience requirements.

c. Further to b.1) mentioned above, having a record of experience within the last ten (10) years on the technical knowledge and practical experience on design, construction, installation and commissioning of Equipment of a 115 kV or above complete conventional or GIS substation. Bidder shall also demonstrate his capacity to perform Work.

Further to b.2) mentioned above, having a record of experience within the last ten (10) years on the technical knowledge and practical experience on design, construction, installation and commissioning of Equipment of a 220 kV or above complete conventional or GIS substation. Bidder shall also demonstrate his capacity to perform Work.

Experience record of the Bidder or either member of the joint venture/consortium, including experience record derived from being a member of other joint venture or consortium in previous project(s) is acceptable, provided that there is a letter from the project owner certifying that the Works as described in c. above were performed by the Bidder or either member of the joint venture/consortium of this project. It is not allowed to combine the experience records of each member of the joint venture/consortium in order to meet the experience requirements.

With respect to item b. and c. above, reference records of either the parent or affiliated companies of the Bidder or of either member of joint venture or consortium shall not be acceptable. If the Bidder has previously formed as the joint venture/consortium with other company and the experience record(s) of the joint venture/consortium meet(s) the requirement set forth herein, such experience record(s) of the joint venture/consortium is(are) also acceptable as the experience record(s) of the Bidder.

d. The Bidder shall propose only one (1) System Integrator and 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 and the system integrator 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.d.5 to I.d.7 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. The System integrator for Transmission STATCOM shall have an excellent reputation and adequate technical knowledge and practical experience on design, construction, installation and commission of Transmission STATCOM as a whole system and shall have an experience as described in Item I.d.5.1. The Equipment for Transmission STATCOM shall be manufactured by the qualified manufacturers who shall fulfill as described in Item I.d.5.1 to I.d.5.2;

5.1 Having one of the following qualifications:

5.1.1 Having a supply record at least two (2) complete Transmission STATCOM projects of the type proposed (MMC STATCOM) at nominal system voltage of 110 kV or above, ±70 MVAR or above of the complete Transmission STATCOM, with at least three (3) consecutive years of successful operation/use in an overseas country (not his own country).

OR

5.1.2 Having a supply record at least one (1) complete Transmission STATCOM project of the type proposed (MMC STATCOM) at nominal system voltage of 110 kV or above, ±70 MVAR or above of the complete Transmission STATCOM, with at least one (1) year of successful operation/use in an overseas country (not his own country).

AND

Having a supply record at least two (2) complete Transmission STATCOM projects at nominal system voltage of 110 kV or above, ±70 MVAR or above of the complete Transmission STATCOM, with at least two (2) consecutive years of successful operation/use.

The record in each above paragraph cannot be repeatedly counted.

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.

6. For Power Transformer of Transmission STATCOM. The Equipment shall be manufactured by the qualified manufacturers who shall fulfill the following requirements. The proposed Transformer shall be the similar Transformers as the definition in Specification of Power Transformer

6.1 Having the following qualifications:

Having experience in manufacturing of at least two (2) sets of Transmission Static Var Compensator (SVC) or STATCOM transformers having the minimum capacity of 100 MVA (one set means one unit of 100 MVA three-phase transformer or three units of 33.33 MVA single-phase transformer), 220 kV or above with at least three (3) consecutive years of successful operation/use. At least one (1) of these two (2) sets shall be operated/used in an overseas country (not his own country).

6.2 Having one of the following qualifications:

6.2.1 Having a short circuit test record of the power transformer of 200 MVA, 220 kV or above. The level of occurring stress in the winding shall be similar to the proposed unit. The short circuit test record shall be performed at international reference laboratory/institute/Transmission as follows: KEMA, EDF, CESI and IREQ.

OR

6.2.2 Further to I.d.6.1 mentioned above, the level of occurring stress in the winding of Transmission SVC or STATCOM transformers at least one (1) unit shall conform to EGAT's specification. The level of occurring stress in the winding shall be similar to the proposed unit.

7. For Control and Protection System of Transmission STATCOM. The Equipment, design, and the Functional/Dynamic Performance Testing Laboratory of Control and Protection System (FPT/DPT) shall be manufactured performed respectively and qualified with following requirements:

7.1 Having one of the following qualifications:

7.1.1 Having a supply record at least two (2) projects of the type proposed (MMC STATCOM) control and protection system at nominal system voltage of 110 kV

or above, ±70 MVAR or above, of Transmission STATCOM, with at least three (3) consecutive years of successful operation/use in an overseas country (not his own country).

OR

7.1.2 Having a supply record at least one (1) project of the type proposed (MMC STATCOM) control and protection system at nominal system voltage of 110 kV or above, ±70 MVAR or above, of Transmission STATCOM, with at least one (1) year of successful operation/use in an overseas country (not his own country).

AND

Having a supply record at least two (2) projects of control and protection system at nominal system voltage of 110 kV or above, ±70 MVAR or above of the complete Transmission STATCOM, with at least two (2) consecutive years of successful operation/use.

The record in each above paragraph cannot be repeatedly counted.

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.5 thru II.d.19 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 230/115 kV Ratings of Power Circuit Breaker, Disconnecting Switch and 115 kV Compact Switchgear shall be manufactured by the qualified manufacturers who shall fulfill the following requirements:

   5.1 Having one of the following qualifications:

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

   OR

   5.1.2 For 230 kV Power Circuit Breaker and Disconnecting Switch:

   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, Disconnecting Switch and Compact Switchgear:

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.

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.

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

6.1 Having one of the following qualifications:

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

OR

6.1.2 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 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.

7. For 52 kV and below ratings of following Equipment: Metal-Clad SF_6 Gas Insulated Switchgear, Power Circuit Breaker, Instrument Transformer, Reactors, Disconnecting Switch and Surge Arrester

Having one of the following qualifications:

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

OR

7.2 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.

8. For Insulated Gate Bipolar Transistor (IGBT)

Having one of the following qualifications:

8.1 Proposing the Equipment of the type and rating which has already been accepted by EGAT.

OR

8.2 Having a supply record of Equipment of the type and similar ratings proposed with operation/use of at least three (3) consecutive years in an overseas country (not his own country) and at least 1,000 units. 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 operation/use of at least one (1) year in an overseas country (not his own country) and at least 1,000 units. 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.

9. For Transmission STATCOM Voltage Source Converter Sub Module (VSC Sub module) based on the proposed converter technology

9.1 Having a supply record of Equipment of the type (Full bridge VSC-Converter) and similar ratings proposed with operation/use of at least one (1) year in an overseas country (not his own country). The ratings and features of Equipment shall be the same or similar rating as EGAT specifies.

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

10. 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, Aluminum Conductor for medium voltage of STATCOM, Aluminum Tube, Aluminum Tube for medium voltage of STATCOM, Compression Connector, Compression Connector for medium voltage of STATCOM and Miscellaneous Hardware, Bus Fittings, Ground Rod, Thermite Welding Material, Grounding Hardware, Conduit and Conduit Fittings

10.1 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.

10.2 Having been granted a license 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.

10.3 Having one of the following qualifications:

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

OR

10.3.2 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).

11. For Insulator

Having one of the following qualifications:

11.1 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:

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

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

OR

11.2 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).

12. For Stationary Battery

Having one of the following qualifications:

12.1 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

12.2 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).

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

Having one of the following qualifications:

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

OR

13.2 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.

14. For 230 kV XLPE Power Cable

Having one of the following qualifications:

14.1 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

14.2 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).

15. For 230 kV Control and Protection Panel and below, having the following qualifications:

15.1 Being local manufacturer.

15.2 Having one of the following qualifications:

15.2.1 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.

OR

15.2.2 Being listed in EGAT ACCEPTED MANUFACTURER LIST FOR CONTROL AND PROTECTION PANEL (LOCAL MANUFACTURER) attached at the end of Section A. Invitation to Bid.

16. Proposing the protective relays from the manufacturers as listed in EGAT ACCEPTED MANUFACTURER LIST FOR PROTECTIVE RELAY attached at the end of Section A. Invitation to Bid and shall be in compliance with the details specified in EGAT's Specifications. Type/Model of the protective relays proposed shall be as specified in EGAT ACCEPTED MULTIFUNCTION RELAY LIST attached at the end of Section A. Invitation to Bid.

17. For Fault Recording System (FRS).

17.1 Having one of the following qualifications:

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

OR

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

17.1.2.1 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.

OR

17.1.2.2 Being listed in EGAT ACCEPTED MANUFACTURER LIST FOR CONTROL AND PROTECTION PANEL (LOCAL MANUFACTURER) attached at the end of Section A. Invitation to Bid.

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.

17.2 Proposing the Fault Recording System (FRS) from the manufacturers as listed in EGAT ACCEPTED MANUFACTURER LIST FOR FAULT RECORDING SYSTEM attached at the end of Section A. Invitation to Bid and shall be in compliance with the details specified in EGAT's Specifications. Type/model of FRS proposed shall be as specified in EGAT ACCEPTED FAULT RECORDING SYSTEM LIST attached at the end of Section A. Invitation to Bid.

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

19. For Closed-circuit television (CCTV) system and equipment

19.1 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.

19.2 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.

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

19.3.1 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

19.3.2 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.

19.4 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.

Definitions:

Complete substation:	New substation or Extension of the existing substation which comprise of at least one transformer circuit and one line circuit. All above scope may not be necessary to include the building construction and the civil works by themselves. However, the design, supervision, and execution of the buildings and the civil works shall be required.
Year(s) of operation/use:	The period of operation Completion date or Commissioning date or Taking over date or Operation date or Put in service date stated in End User Certificate or the sufficient documentary evidence before bid opening.
The complete Transmission STATCOM :	The new complete or the complete refurbishment of a whole Transmission STATCOM with excellent reputation and adequate technical knowledge and practical experience in the design, construction, installation and commission of Transmission STATCOM as a whole system. This may not include the supply scope of Power Transformer of Transmission STATCOM; however, the parameter design of the Power Transformer shall be included to successful control and operation at the high voltage Point of Common Coupling (PCC).
Project:	The Project shall be the experience records complied with one of the follows; 1. The different substations or locations, even though these are in the same Contract. 2. The different Contracts, even though these are in the same substations or locations.

A-5. Joint Venture or Consortium

In the event that the successful Bidder is a joint venture or a consortium formed of two or more companies, EGAT requires that the parties to the joint venture or the consortium accept joint and several liability for all obligations under the Contract.

A-6. Preparation and Delivery of Bids

Bids shall be prepared in accordance with the Instructions to Bidders contained in the Bidding Documents in one (1) original ***hard copy and one (1) electronic copy contained in USB flash drive***, in English, on the bid forms included for this purpose and shall be accompanied with a bid security as required under Article B-3. Bid Security ***in a separate envelope.***

For preparation of original hard copy, each page of the original hard copy shall be marked with the volume number and the page number in the lower right-hand corner, for example, Volume 1 of 10 and Page 1 of 100.

For preparation of electronic copy, each volume of the signed original hard copy shall be scanned into one (1) PDF file and each PDF file shall be named according to the volume number.

The original hard copy and the electronic copy of the proposal shall be placed in two (2) separate sealed envelopes:

Envelope I which shall ***consist of the original hard copy of technical proposal, and a USB flash drive containing the electronic files of the original technical proposal in PDF and Excel format, as required by EGAT, and***

Envelope II which shall ***consist of the original hard copy of price proposal, and a USB flash drive containing the electronic files of the price proposal in PDF and Excel format, as required by EGAT.***

In the event of any discrepancy between the original hard copy and the electronic copy, the original hard copy shall govern.

Envelope I

Technical proposal will be placed in separate sealed envelope marked in capital letters in the lower left-hand corner as follows:

INVITATION TO BID NO. TIEC-S-11

SUPPLY AND CONSTRUCTION OF STATIC SYNCHRONOUS COMPENSATOR AT 230 kV CHAIYAPHUM 2 SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

TECHNICAL PROPOSAL

The Envelope for the technical proposal shall contain the following :

a. the completed Proposal Data Forms of the proposed proposal(s)

b. reference documents pertaining to Bidder's qualification and experience under Article A-3. Eligibility of Bidders: General Requirements, A-4. Eligibility of Bidders: Technical Requirements, and Article B-8. Information to be submitted with Bid

c. delivery date guaranteed by Bidders

d. any minor deviations on Technical Specifications

e. any other technical information and drawings the Bidder deems to be adequate to explain his bid

f. Confirmation Form of not being a Jointly Interested Bidder with other Bidders and not being a person who undertakes any actions as an Obstruction of Fair Price Competition, and Registration/Non-registration with the Revenue Department as a VAT registrant

   If the Bidder has registered as a VAT registrant, he shall submit EGAT an evidence of VAT registration. On the contrary, if the Bidder is not registered as a VAT registrant, he shall inform EGAT whether he will register as a VAT registrant or not.

   In case the Bidder is a consortium, each member of the consortium shall fill in the Confirmation Form provided for consortium Bidders.

g. Filled-in Documentary List and documents required according to Additional Regulation

h. USB flash drive containing electronic files of the original technical proposal in the following formats :-

- PDF files of all pages of each volume of the technical proposal, and

- Excel files of filled-in Proposal Data.

Strictly no prices or reference to price shall be made in the documentation contained in this Envelope. Violation of this requirement will be reason for rejection of the bid.

Envelope II

Price proposal will be placed in separate sealed envelope marked in capital letters in the lower left-hand corner as follows:

INVITATION TO BID NO. TIEC-S-11

SUPPLY AND CONSTRUCTION OF STATIC SYNCHRONOUS COMPENSATOR AT 230 kV CHAIYAPHUM 2 SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN NORTHEASTERN, LOWER NORTHERN, CENTRAL REGIONS AND BANGKOK AREA TO ENHANCE SYSTEM SECURITY

PRICE PROPOSAL

The Envelope ***II*** for the price proposal shall contain the following :

a. price schedules according to Section C

b. ***Discount Form***

c. USB flash drive containing electronic files of the price proposal in the following formats :-

- PDF files of all pages of each volume of the price proposal, and

- Excel files of filled-in Price Schedule

The technical proposal and the price proposal shall be addressed and delivered to ***EGAT*** on or before 10:00 a.m., Bangkok Standard Time, see Tentative Schedule

If the envelope(s) is not sealed, marked and addressed as required above, EGAT will assume no responsibility for the bid misplacement or premature opening.

Technical proposals will be opened publicly at ***place and*** time specified ***in Tentative Schedule.***

Bids received after the time stipulated herein shall be rejected and returned unopened.

The technical proposals will be reviewed to determine their responsiveness to the Specifications and requirements.

The price proposals of the responsive technical proposals will be opened publicly at the place and time which will be specified at a later date, which will not be later than 150 Days after the technical proposal opening.

A-7. Availability of Bidding Documents

The Bidding Documents are available for examination ***and online purchase at http://www4.egat.co.th/fprocurement/biddingeng/*** and can be obtained ***by downloading via link provided by EGAT*** upon payment to EGAT, non-refundable, in the amount of USD 500.- or Baht 15,000.-. These prices include the value added tax.

Note : At the time of bidding, EGAT's Specifications and all Drawings need not be submitted, although they are considered as part of the Bidding Documents.

EGAT ACCEPTED FAULT RECORDING SYSTEM LIST

Accepted Type	Manufacturer
IDM+	Qualitrol
M871	GE
7KE85 (*)	Siemens
TESLA 4000 (*)	ERL Phase
TR 2100	Rochester (RIS)
TR 3000 (**)	

Remarks

(*) Applicable to IEC 61850 for both station bus and process bus with the certification issued by the third party laboratory and specifying that the said FRS conforms to "IEC 61850 edition 2 parts 6, 7-1, 7-2, 7-3, 7-4, and 8-1".

(**) Applicable to IEC 61850 only for station bus with the certification issued by the third party laboratory and specifying that the said FRS conforms to "IEC 61850 edition 2 parts 6, 7-1, 7-2, 7-3, 7-4, and 8-1".

Notes

1. The procedures for being listed in EGAT ACCEPTED FAULT RECORDING SYSTEM LIST are specified in the EGAT's Pre-Qualification (PQ) process, of which the details can be provided by Transmission System Engineering Division on request.

2. If any types of FRS in the list are planned to discontinue the manufacturing, the manufacturer or the representative is responsible for informing EGAT at least 1 year before the unavailable date.

Bid No. TIEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หพอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

EGAT ACCEPTED MANUFACTURER LIST FOR

CONTROL AND PROTECTION PANEL (LOCAL MANUFACTURER)

Description	Manufacturer	Designed by
500 kV Control and Protection Panel	Hitachi Energy (Thailand) Limited	Hitachi Energy (Thailand) Limited
	Precise System and Project Co., Ltd.	Precise System and Project Co., Ltd.
	U-tah Industry Limited Partnership	U-tah Industry Limited Partnership
	SCI Electric Public Company Limited	Siemens Limited
230 kV and below Control and Protection Panel	Hitachi Energy (Thailand) Limited	Hitachi Energy (Thailand) Limited
	C&T Metal Products Co., Ltd.	Easun Reyrolle Limited, India
	Precise System and Project Co., Ltd.	Precise System and Project Co., Ltd.
	U-tah Industry Limited Partnership	U-tah Industry Limited Partnership
	SCI Electric Public Company Limited	SCI Electric Public Company Limited
	Timpano Electrical Co., Ltd.	Timpano Electrical Co., Ltd.
	Mantra Switchgear Co., Ltd.	Siemens Limited

Notes

1. The procedures for being listed in EGAT ACCEPTED MANUFACTURER LIST FOR CONTROL AND PROTECTION PANEL (LOCAL MANUFACTURER) can be provided by Transmission System Planning and Project Division on request.
2. The control and protection panel shall be manufactured and designed by the manufacturer/company written in the same row.

Bid No. TIEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หฟอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

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

Bid No. TIEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หพอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

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, UK
	Toshiba / Japan, Vietnam
	Schneider Electric / France, UK
	ZIV / Spain
	INGETEAM / Spain
	NR Electric / China
	Mitsubishi / Japan
	Protecta / Hungary
	Arcteq / Finland
	Sifang / China

Bid No. TIEC-S-11

Sep 2023

เอกสารไม่ควบคุม
รับรองสำเนาโดย หพอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

EGAT Accepted Multifunction Relay List

Manufacturer	Model	87L			21P			21BU			25			79			67			51			50BF			50EF			27/59			81			24			87K/87R/87C			87B (H)			87B (L)			60C (V)			60C (I)			Remark
		500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	
ABB	RED670 (*)																																																				
	REL670 (*)																																																				
	RET670 (*)																																																				
	RET650 (**)																																					*	*	*														* 3-restraint
	REB650 (**)																																																				
	REB670 (*)																																																				
	REB500																																																				
	REQ650 (**)										*	*	*																																								* Only product version 2.1 is accepted.
GE	P543 (**)																																																				
	L90 (*)																																																				
	P443 (*)																																																				
	D30																																																				
	D60 (*)																																																				
	ALPSDA1																																																				
	P64x (*)																			**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	*	*	*													* Only P643, P645 ** Only P643
	T35																																																				
	T60 (*)																																																				
	P746																			*	*	*	*	*	*	*	*	*																									* Must add 1 Relay for ground unit (More than 6 bays case)
	P740 (*)																																																				
	P747																																																				
	B90 (**)																																																				
	B30																																											*	*	*								* Only for breaker and a half, double bus double breaker or main and transfer bus arrangement
	P14Nx																																																				
	P14Dx (**)															*									**																												* Only 3 Pole recloser function ** Only 3-phase breaker failure function
	P841																																																				
	P141 (**)																																																				
	C60																																																				
	F60																																																				
	F650 (**)																																																				
	SR350																																																				

Bid No. TEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หพอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

Oct 2023

EGAT Accepted Multifunction Relay List

Manufacturer	Model	87L			21P			21BU			25			79			67			51			50BF			50EF			27/59			81			24			87K/87R/87C			87B (H)			87B (L)			60C (V)			60C (I)			Remark
		500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	
GE	DRS																																																				
	P94Vx																																																				
	MIV																																																				
	P94V																												*	*	*																						* None of VT input (open delta connection) for 59N.
	P143 (**)															*																																					* Only 3 Pole recloser function
SEL	SEL-311L																																																				
	SEL-411L (*)																																																				
	SEL-421 (*)																																																				
	SEL-311C																																																				
	SEL-387																																						*	*													* 4-restraint
	SEL-487E (*)																																																				
	SEL-587																																							*													* 2-restraint
	SEL-787 (**)																																							*													* 4-restraint
	SEL-587Z																																																				
	SEL-487B (*)																																																				
	SEL-501																																																				
	SEL-351A																																																				
	SEL-451 (*)																																																				
	SEL-751 (**)																																																				
	SEL-551																																																				
	SEL-751A																																																				
Siemens	7SD52 (**)																																																				
	7SA522 (**)																																																				
	7SA6 Series (**)																																																				
	7SA87 (*)																																																				
	Duobias (**)																																																				
	7UT6 (**)																																					*	*	*													* 5-restraint
	7UT82 (**)																																					*	*	*													* 2-restraint
	7UT86 (*)																																					*	*	*													* 3-restraint
	7SS52 (**)																																																				
	7SS60																																											*	*	*							* Only for breaker and a half, double bus double breaker and main&transfer bus arrangement
	7SS85 (*)																																																				
	7VK6 Series (**)																																																				

Bid No. TIEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หพอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

Oct 2023

EGAT Accepted Multifunction Relay List

Manufacturer	Model	87L			21P			21BU			25			79			67			51			50BF			50EF			27/59			81			24			87K/87R/87C			87B (H)			87B (L)			60C (V)			60C (I)			Remark
		500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	
Siemens	7SJ62 (**)																																																			
	7SJ85 (*)															*									**																											* Only 3 Pole recloser function ** Only 3-phase breaker failure function
	7SJ61 (**)																																																			
	7SJ82 (**)																																																			
	7VK61 (**)																																																			
	7SL82 (**)																																																			
	7SL87 (*)																																																			
	7RW80 (**)																																																			
	7SA82 (**)																																																			
Toshiba	GRZ200 (*)																																																			
	GRT200 (*)																																																			
	GRD200 (*)																																																			
	GRE140																																																			
	GRB200 (*)																																																			
	GRL200 (*)																																																			
Schneider Electric	P543 (*)																																																			
	P443 (*)																																																			
	P645 (*)																																					*	*	*													* 5-restraint
	P746 (*)																																																			
	P740 (**)																																																			
	P821																							*	*																											* Only firmware version 1.F is accepted
	P141 (**)																																																			
	P143 (**)																																																			
	P120																																																			
	P122																																																			
ZIV	ZLV																																																			
	IDV																																																			
	IRL																																																			
	IRV																																																			
Ingeteam	EF-LD (*)																																		*	*	*										**	**	**				* Only 2-step overfluxing relay ** Only for open delta connection
	EF-ZT (*)																																														*	*	*				* Only for open delta connection

Bid No.: TIEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หหอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

Oct 2023

EGAT Accepted Multifunction Relay List

Manufacturer	Model	87L			21P			21BU			25			79			67			51			50BF			50EF			27/59			81			24			87K/87R/87C			87B (H)			87B (L)			60C (V)			60C (I)			Remark
		500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	500 kV	230 kV	115 kV	
Ingeteam	EF-TD (*)																																					*	*	*							**	**	**				* 3-restraint ** Only for open delta connection
	EF-MD (*)																																														*	*	*				* Only for open delta connection
	DA-PT (**)																																														*	*	*				* Only for open delta connection
NR Electric	PCS-931 (*)																																																				
	PCS-902 (*)																																																				
	PCS-978 (*)																																																				
	PCS-9611 (*)																																																			*	* Only 1 unbalance input current.
	PCS-978S (*)																																																				
	PCS-9611S (*)																																																			*	* Only 1 unbalance input current.
	PCS-915SC (*)																																																				
Mitsubishi	MRD-HA (**)																																							*														* 3-restraint
	MBP-H1A (**)																																												*	*							* In case of double bus single breaker arrangement, maximum 8 feeders with 1 bus coupler and 2 bus sections are allowed.
Protecta	DTIVA-E3																																																				
	DTVA-E1																																																				
	DTRV-E2																																																				
	DGYD																																																				

Remarks

(*) Applicable to IEC 61850 for both station bus and process bus with the certification issued by the third party laboratory and specifying that the said relay conforms to "IEC 61850 edition 2 parts 6, 7-1, 7-2, 7-3, 7-4, and 8-1".

(**) Applicable to IEC 61850 only for station bus with the certification issued by the third party laboratory and specifying that the said relay conforms to "IEC 61850 edition 2 parts 6, 7-1, 7-2, 7-3, 7-4, and 8-1".

Notes

1. The procedures for being listed in EGAT ACCEPTED MULTIFUNCTION RELAY LIST are specified in the EGAT's Pre-Qualification (PQ) process, of which the details can be provided by Transmission System Engineering Division on request.
2. If any types of relay in the list are planned to discontinue the manufacturing, the manufacturer or the representative is responsible for informing EGAT at least 1 year before the unavailable date.
3. The relays shall be configured to comply with all EGAT's required functions.

Bid No. TEC-S-11

เอกสารไม่ควบคุม
รับรองสำเนาโดย หพอ-ส. กสส-ส. อวส.
ก่อนนำไปใช้งาน
ต้องตรวจสอบ Revision ล่าสุด
ฝ่ายวิศวกรรมระบบส่ง กฟผ.
5 กุมภาพันธ์ 2569

Oct 2023

SCOPE OF WORK

H-1. General

No.	Substation	Page
1.	230 KV CHAIYAPHUM 2 SUBSTATION	
	- GENERAL	H1-1
	- ELECTRICAL PART	H1A-1
	- CONTROL AND PROTECTION PART	H1B-1
	- COMMUNICATION PART (NONE)	-
	- CIVIL AND ARCHITECTURAL PART	H1D-1

1. 230 KV CHAIYAPHUM 2 Substation

GENERAL

The 500/230 kV Chaiyaphum 2 Substation with gas-insulated switchgear (GIS) is located in Tambon Phon Thong, Amphur Mueang, and Chaiyaphum province.

The new work at Chaiyaphum 2 Substation includes the design, supply, and construction required for the complete installation of STATCOM No.2. The voltage level at the point of connection for STATCOM No.2 is 230 kV. The STATCOM shall comprise all necessary equipment, with specific requirements detailed in the Specification.

At Chaiyaphum 2 Substation, STATCOM No.1 rated at ±300 Mvar and connected to the 230 kV bus is currently under construction and is scheduled for completion in January 2030.

The Scope of work comprises of two schedules as follows:

Schedule 1 : 230 KV CHAIYAPHUM 2 substation

Design, supply, construction and modification work for connection between the existing 230 kV Chaiyaphum 2 GIS Substation and the new STATCOM No.2 as follows:

- One (1) 230 kV feeder and related equipment for connection between 230 kV GIS bushing and a new set of STATCOM No.2 (±300 Mvar).
- Modification the existing of 22 kV system for supplying the power to station service transformer (KW1AB & KW2AB).

Schedule 2 : Static Synchronous Compensator (STATCOM)

Design, supply and construction of new STATCOM No.2. The nominal continuous rating of the STATCOM is 300 Mvar inductive and 300 Mvar capacitive at 1.0 p.u. voltage, which is connected to 230 kV bus at Chaiyaphum 2 Substation.

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 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.

ELECTRICAL PART

Schedule 1 and 2 : 230 KV CHAIYAPHUM 2 substation and Static Synchronous Compensator (STATCOM)

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. **Existing 230 kV Substation and STATCOM**

1.1 Design, supply, and installation of all equipment and related accessories required for a connection between the existing 230 kV Substation and STATCOM.

1.2 Design, supply and installation for modification of the existing 22 kV system that was connected to tertiary winding of Power Transformer KT1A & KT2A to completion supply power for station service transformer KW1AB & KW2AB (low-voltage power supply for STATCOM system).

1.3 Design, supply, and installation of all equipment required for the complete STATCOM.

1.4 Design, supply, and installation of three (3) sets of a single-phase 100 MVA (at 1.0p.u. voltage.), 230-xx kV STATCOM transformer. In addition, the Contractor shall supply one (1) set of a single-phase 100 MVA (at 1.0p.u. voltage.), 230-xx kV STATCOM transformer for a spare unit. Note that the secondary voltage of the STATCOM transformer shall be determined by the Contractor to meet EGAT's requirements and to optimize the cost of the STATCOM.

1.5 Design, supply, and installation of surge capacitors, if required to limit the overvoltage caused by the surge transference to the secondary side of the STATCOM transformer. The calculation for selecting the ratings of the surge capacitors shall conform to IEC or IEEE standards and be submitted to EGAT for approval.

1.6 The data of the existing system for STATCOM Design:

1.6.1 The voltage unbalance at Chaiyaphum 2 Substation (measured by VT, VZ1D) is 0.54% of the nominal voltage of 230 kV.

1.6.2 Total Harmonic Distortion Voltage (Measured from VT, VZ1D) as follows:

	Phase A	Phase B	Phase C
% THDv	1.01	0.97	0.90

Table 1: Total voltage Harmonic Distortion (THDv) in the percent of the nominal voltage of 230kV

1.6.3 The Voltage harmonic distortion in percent of the nominal voltage of 230 kV from 2nd to 49th harmonic orders as follow:

Harmonic Order	(%) V
2	0.02
3	0.37
4	0.02
5	0.84
6	0.03
7	0.69
8	0.02
9	0.03
10	0.02
11	0.11
12	0.02
13	0.05
14	0.02
15	0.02
16	0.02
17	0.03
18	0.02
19	0.06
20	0.02
21	0.02
Harmonic Order	(%) V
22	0.02
23	0.02
24	0.01
25	0.03

Harmonic Order	(%) V
26	0.02
27	0.02
28	0.02
29	0.03
30	0.02
31	0.03
32	0.03
33	0.03
34	0.04
35	0.05
36	0.03
37	0.03
38	0.01
39	0.01
40	0.01
41	0.01
42	0.01
43	0.01
44	0.01
45	0.01
Harmonic Order	(%) V
46	0.01
47	0.01
48	0.03
49	0.02

Table 2: The Voltage harmonic distortion in percent of the nominal voltage of 230 kV from 2nd to 49th harmonic orders

Note: The result of Harmonic Distortion measured from CCVT may be erroneous because CCVT may not have a good response at high frequency.

1.7 The contractor shall supply identification plates for the both indoor and outdoor substation. The material, size and color shall conform to Dwg. No. SE-ID-8-01 and SE-ID-0-01.

1.8 Design, supply and installation of miscellaneous hardware for:

- The connection from the 230 kV GIS air bushings to STATCOM NO.2.
- The connection from the existing 22 kV system (Power supply for STATCOM system).

1.9 Sag and tension of phase wires and overhead ground wires shall be designed and calculated by Contractor. The calculation shall be based on internationally-accepted standards. The said calculation shall be submitted to EGAT for approval.

1.10 The voltage fluctuation in the AC power supply voltage for STATCOM will be controlled in the range +/-10 %.

1.11 Design, supply, and installation of the operating platform for safety during operating the grounding switch and during the manual operation and maintenance of the main disconnecting switch. The platform shall also be connected to the main switch, motor operating mechanism housing and the main blade operating pipe.

1.12 Design, supply, and installation of weatherproof instrument transformer junction boxes with terminal blocks, circuit breaker, and other equipment required for the termination of cables from CT's and VT's.

1.13 Design, supply, and installation of marshalling cubicle for the STATCOM transformers.

1.14 Design, supply, and installation of all hardware for post and suspension insulator assembly in STATCOM area.

1.15 Design, supply, and installation of miscellaneous hardware and conductor required for the complete installation.

1.16 The spare part of hardware for reactor in STATCOM shall be supplied by the Contractor.

2. STATCOM : Arrangement and access of equipment

2.1 The Design, supply, and installation of the following:
- Identification plates
- Danger notice plates
- "No pacemaker" plates
- "No access for persons with metallic implants" plates
- Other plates if necessary

2.2 Design, supply, and installation of fences for STATCOM area. The Contractor shall sectionalize the fence for STATCOM area every 15.0 m (if necessary).

2.3 The minimum phase spacing of main bus and branch bus shall be as follows :

- STATCOM voltage less than 11 kV, the phase spacing shall be 0.70 m (center-to-center) (minimum). In addition, electrical clearance surface to surface shall comply with IEEE standard.
- STATCOM voltage at 11 kV up to 33 kV, the phase spacing shall be 1.00 m (center-to-center) (minimum). In addition, electrical clearance surface to surface shall comply with IEEE standard.

2.4 The service roads for STATCOM maintenance shall be provided and designed by the Contractor. They shall include but not limited to the following:

- The service road beside STATCOM with the minimum width of 4.00 m.
- The locations of the service roads as mentioned above previously will be approved by EGAT. The contractor shall submit the clarification document explaining in details how to access for maintenance and working in the STATCOM area to make sure that the locations of service roads are suitable in terms of safety, engineering practice and maintenance.

2.5 The minimum height of the conductors or bus bars crossing the service road shall be 5.00 m for the STATCOM area.

2.6 The minimum distance between the surface of the reactor and fence shall be designed to meet the requirement as per EGAT specification.

2.7 The asphalt shall be provided at the STATCOM area to prevent unwanted weeds from growing. The top of the asphalt shall be at the same level as the finished grade of soil, and then shall be finished by a layer of 0.10 m thick crushed rocks.

2.8 Cable laying at the ground floor of the STATCOM building shall be in cable trenches. Cable ladders shall not be used.

2.9 The Contractor shall design the key interlocking system that is suitable for maintenance, safety and engineering practice. The contractor shall submit Interlocking system report to EGAT for approval after Contract awarded.

2.10 The Contractor shall supply humidity and temperature sensor in the control room and valve room.

2.11 The voltage level of the insulator for STATCOM bus bar and disconnecting switch of the STATCOM equipment shall be at least 33 kV.

2.12 The Contractor shall design STATCOM bus system by considering short circuit force, maintenance access, equipment installation and working space.

3. STATCOM : Design study and performance

3.1 Design, The Contractor shall submit all reports on the system studies, engineering and design, and shall satisfy EGAT as to the completeness and accuracy of the studies to be carried out in accordance with the Contract. The

Contractor shall also carry out all studies which are necessary for completion of the design and engineering.

The studies shall include but not limited to the following:

- Studies for deciding the design and rating points, operational strategy and limits of the STATCOM system.
- Current and voltage stresses during both steady-state and transient conditions.
- Harmonic performance and component rating.
- Studies on overvoltage protection and insulation coordination for all equipment under the Contractor's scope of supply, studies for integration of the STATCOM system to the existing system, and studies to ensure the proper coordination of the metal oxide surge arresters supplied with those located in the AC system where other surge arresters are used.
- Control and control interaction study.
- Studies to ensure and demonstrate that the existing 230 kV mechanically-switched capacitor banks (MSCs) and existing STATCOM at Chaiyaphum 2 substation and nearby generators shall not be adversely affected by the operation of the STATCOM system, particularly with regard to harmonic injection and voltage and current stresses.
- Studies that mentioned in this scope of work shall be submitted to EGAT at bidding stage.

3.2 The study on Harmonic performance and component rating shall be based on values of components, component tolerances, detuning effects, and harmonic currents, which the Contractor shall determine. The harmonic performance and component rating calculation shall be submitted with the proposal on the Bidding stage.

3.3 The maximum current and short circuit current for each branch of STATCOM shall be determined and clearly shown in the STATCOM design study. The study shall consider and show the manufacturing tolerances of the equipment. In addition, the short circuit study shall be submitted to EGAT for approval at bidding stage.

3.4 The Contractor shall determine the fundamental voltage and current stresses on the STATCOM components. The values of the following variables for all key operating points in the V-I curve shall be shown in the STATCOM design study and submitted with the proposal on the Bidding stage.

The variables of interest include but not limited to the following:

- Primary side voltage in p.u. and kV (V1)
- Secondary side voltage in p.u. and kV (V2)
- Reactive power at the primary side in Mvar (Q1)
- Reactive power at the secondary side in Mvar (Q2)

Current of STATCOM branch in Ampere(A) ($I_{STATCOM}$)

3.5 The network impedance data provided by EGAT in the Bidding stage given in Table 3:

No.	Year	load condition	File/Folder name:
1.	2029	Peak load (Evening)	Chaiyaphum2_No.2.zip
2.	2029	Peak load (day)	Chaiyaphum2_No.2.zip
3.	2029	Light load (summer season)	Chaiyaphum2_No.2.zip
4.	2029	Light load (winter season)	Chaiyaphum2_No.2.zip
5.	2029	Light load (light rainy season)	Chaiyaphum2_No.2.zip
6.	2029	Light load (full rainy season)	Chaiyaphum2_No.2.zip
7.	2034	Region peak (RP)	Chaiyaphum2_No.2.zip
8.	2034	System light (SL)	Chaiyaphum2_No.2.zip
9.	2034	System peak (SP)	Chaiyaphum2_No.2.zip
10.	2037	Region peak (RP)	Chaiyaphum2_No.2.zip
11.	2037	System light (SL)	Chaiyaphum2_No.2.zip
12.	2037	System peak (SP)	Chaiyaphum2_No.2.zip

Table 3: The name and detail of cases for harmonic impedance data that EGAT will provide to Bidders

3.6 EGAT will provide the following data required for the Real Time Digital Simulation (RTDS) to be performed during Factory acceptance test of the STATCOM control system. They will be provided after Contract awarded;

- Four AC reduced networks for the functional and dynamic performance test, and POD performance test to be implemented in real time digital simulator (RTDS).
- Maximum ten scenarios for functional and dynamic performance test per each AC reduced networks above.

Maximum ten scenarios for POD performance test per each AC reduced networks above.

3.7 There are 2 sets of existing 230 kV, 72 Mvar mechanically-switched capacitor banks (MSCs) at Chaiyaphum 2 substation. Their description of the existing MSCs is summarized in Table 4. The configuration is shown in Figure 1.

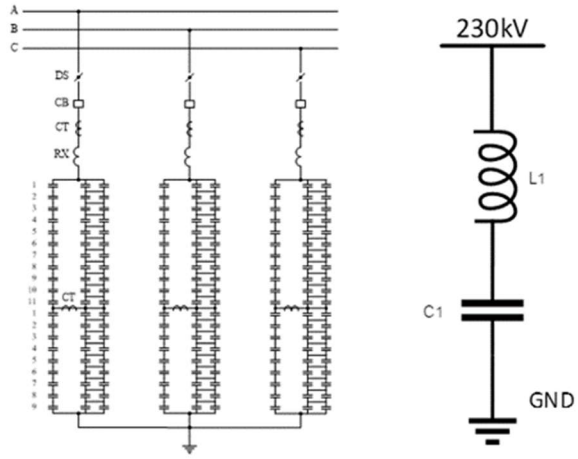


Figure 1: Configuration of 230 kV 72 Mvar

Description	Rated
Inrush Current Limiting Reactor(L1)	
- Rated current (A)	250
- Rated Power (Mvar)	0.02
- Inductance (mH)	1
Capacitors (C1)	
- Rated voltage (kV)	239.2
- Rated Power (Mvar)	72
Capacitance (µF)	4.011

Table 4: The component and rating of 230 kV mechanically-switched capacitor banks
Note: The maximum voltage for the capacitor banks and reactor of 72 Mvar MSCs are 110% rated rms voltage and 120% of rated peak voltage.

3.8 There is an existing STATCOM ±300 Mvar at Chaiyaphum 2 Substation connected to 230 kV Bus.

3.9 The existing MSCs and first set of STATCOM at Chaiyaphum 2 Substation shall be considered in the second set STATCOM design study. The study shall examine and clearly show that the steady-state and transient stresses on the existing MSCs and 1st STATCOM do not exceed their ratings or posed any damage when 2nd STATCOM is operated at 230kV bus Chaiyaphum 2 Substation. The Contractor shall show the restricted operation case of the stress study on the existing components of the MSCs and 1st STATCOM.

The stresses study of existing equipment (two sets of 230kV MSCs & 1st STATCOM shall be submitted with the proposal on the Bidding stage. In case that, MSCs and 1st STATCOM at the substation are over stressed and damaged by any operation of STATCOM and MSCs. Contractor shall show the operating condition/strategy or restricted operation in the stress study or calculation.

4. Grounding system

4.1 Chaiyaphum 2 substation can be divided into the existing area and the new area. The existing area also has its existing ground grid and grounding system. The Contractor's scope of work comprises the following:

<u>The existing area</u>:

- Evaluate whether the existing grounding system require modification to meet the safety criteria as per IEEE-80 standard. This requirement shall be responsible by contractor. The Contractor shall not consider this as additional cost and time to EGAT.
- Design, supply, and installation the modification of the existing ground grid and grounding system (if deemed necessary).
- Connect the existing ground grid to the new ground grid.

<u>The new area</u>:

Design, supply and installation of the new ground grid and grounding system of the following:

- 230 kV substation (including grounding connection for all equipment, facilities, structures within)
- 22 kV system (Power supply for STATCOM system)
- STATCOM system

4.2 Design, supply and installation of the grounding equipment and miscellaneous hardware. The type of grounding conductor for the substation grounding system shall be 4/0 AWG bare copper wire.

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

- The maximum ground grid conductor spacing (D_0) shall be 5 meters.
- The number of ground rod shall be 50 pieces.

4.4 The Contractor shall conduct soil resistivity measurement. Based on the measured soil resistivity, the Contractor shall evaluate/design the ground grid by hand calculation using the equations in IEEE-80 standard, and submit the calculation report to EGAT for Approval. The parameters for the calculation are as follows:

- Fault current division factor (s_f) value = 1
- Fault current = 50 kA or recommended by EGAT during Approval
- Fault clearing time (t_f) = 1 second or recommended by EGAT during Approval

4.5 The Contractor shall determine the size of grounding conductors for the substation grounding system and select the number of 4/0 AWG bare copper wires accordingly.

The price of the new ground grid in the new area evaluated based on the given parameters above shall be a price reference when considering the extra work or deducted work.

- If the grounding conductor spacing obtained by hand calculation, i.e. D_1 is smaller than D_0, the Contractor shall design a grounding grid using the software. The software shall be certified to be acceptable for commercial use.

4.6 In the area where grounding conductors are located within the magnetic clearance of some equipment, the grounding system shall be designed and installed without having a closed loop. The Contractor shall show the magnetic field plot of the reactor in the grounding system drawing.

4.7 All substation metal parts such as structure, equipment, cable trays in STATCOM station, and fence of the STATCOM area shall be connected to the grounding system by exothermic connection.

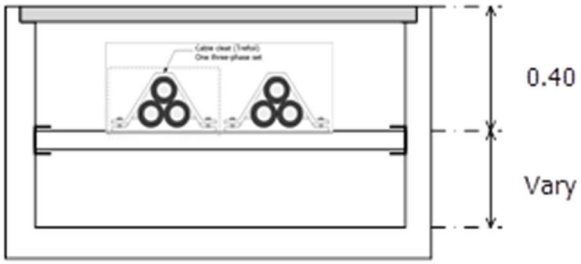
4.8 The design of the grounding system for the STATCOM building shall follow the recommendations made by the STATCOM manufacturer.

5. XLPE Cable System (medium voltage)

22 kV XLPE Cable System (Connection from tertiary side of Auto-transformer to Station service transformer)

5.1 Design, supply and installation of 22 kV XLPE cable system complete from the tertiary winding of Power Transformer KT1A & KT2A to the Station service transformers KW1AB & KW2AB

- The design and calculation of the 22 kV XLPE cable system shall conform to IEC and/or IEEE standards.
- The 22 kV XLPE cable shall be 1/C-xxx sq.mm (not less than 35 sq.mm.) single-core with copper conductor.
- The 22 kV XLPE cable shall be installed in trefoil formation as shown in the figure below (for example).



- The bending radius of the XLPE cable shall be checked by Contractor for the XLPE cable installation and cable trench design.
- The cable trench for 22 kV XLPE cable system shall be with metallic trench covers.
- Ampacity calculation report to be submitted for approval:
- The Contractor shall design the 22 kV cable system such that one (1) 1/C-xxx sq.mm XLPE cable shall be able to carry the continuous current as follows:

    - no less than station service transformers (KW1AB & KW2AB) current rating
- given that the ambient temperature is not less than 45°C and at least the following cases shall be carried out for a comparative study.
    - In open air with the effect of solar heat
    - In trough without the effect of solar heat
    - EGAT may request additional cases to be carried out if deemed necessary. The Contractor shall not consider this as additional cost and time to EGAT.
- The calculation shall conform to IEC standard. The other parameters used in the design shall be practical, reasonable, and operational. The calculated continuous current rating shall be shown in the single-line diagram drawing.
- Sheath induced voltage calculation report to be submitted for approval:
- For the XLPE cable system with single-point bonding (if selected), the sheath induced voltage calculation report shall be submitted to EGAT for Approval. The calculation shall conform to IEEE standard. The assumptions and parameters for the calculation shall have reliable internationally-accepted supporting references.
- The report shall clearly examine the sheath induced voltage under the following cases
    - At rated current
    - At faults (at least including 3-phase, Single-line-to-ground, Double-line fault types)
    - EGAT may request additional cases to be carried out if deemed necessary. The Contractor shall not consider this as additional cost and time to EGAT.
- The sheath induced voltage under rated current shall not exceed 60V.
- In case that the calculation result indicates that the Surge Voltage limiter (SVL) is required to protect the jacket of the cable from the overvoltages, it is the responsibility of the Contractor to design, supply, and install the SVL and all related hardware and accessories for a complete installation e.g. link boxes, disconnecting switches etc. In addition, the clarification document for the SVL rating selection, drawings for SVL installation and maintenance manual shall be provided and submitted for Approval.
- Details of sheath bonding for installation shall be provided and shown in drawings.
- EGAT reserves the right to request more details and clarification if deemed necessary.

6. Lightning protection

6.1 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

- 900 kV for 230 kV substation shall be used for the calculation instead of Critical Flashover voltage (CFO).
- BIL rating of the STATCOM equipment for the STATCOM area shall be used for the calculation instead of Critical Flashover voltage (CFO).

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

6.2 Lightning protection system system shall be designed to meet IEC, IEEE, E.I.T. standards or internationally-accepted standards.

6.3 The Lightning Protection Level (LPL) of Level 1 shall be used for the design of lightning protection system for the STATCOM Building.

The overhead ground wire is not permitted for the lightning protection system for the STATCOM building. Air terminal rods installed at the roof shall be used instead. The Contractor shall also supply and install test boxes as per bidding drawing.

7. Station service system

7.1 Design, supply and installation of the station service system complete with integral accessories to provide the complete system operation. The station service system shall mainly consist of as follows:

- xxx kVA, 22,000-400/230 V distribution transformer (KW1AB)
- xxx kVA, 22,000-400/230 V distribution transformer (KW2AB)
- Load Center Unit Substation (LCUS)
- 22 kV drop-out fuses
- 22 kV Load break switch
- 600 V, xxx A safety switches

  Remark The sizing of safety switch (A) for STATCOM system shall be specified and designed by Contractor.

- 22 kV equipment, and AC & DC distribution boards, stationary batteries, battery chargers, power cables, and all related equipment for a complete operation.
- Modification the existing of 22 kV system that connected from tertiary winding of Power Transformer (KT1A & KT2A) for supplying the power to station service transformer (KW1AB & KW2AB)

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

7.3 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 and emergency lighting for at least 3 hours as shown in figure 2. if normal station service fails. 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 Drawing.

The following factors that influence the capacity of the battery shall be used in the capacity of the battery design:

- The temperature coefficient of 1.10
- The design margin factor of 1.15
- The aging factor of 1.25

The calculation shall be submitted to EGAT for approval.

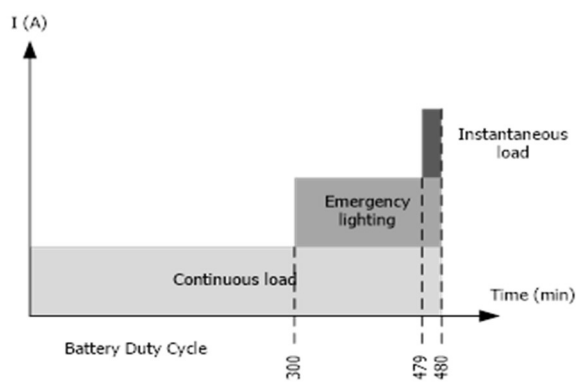


Figure 2. Battery duty cycle diagram

7.4 Design, supply, and installation of the UPS for backup power. The size of the UPS shall be designed by the Contractor to be capable of supplying power to the STATCOM cooling system and other essential load for the STATCOM operation for at least 3 minutes. The UPS shall be located in the electrical room. If the battery of the UPS cannot be contained in the same enclosure, the battery of UPS shall be installed in the battery room.

8. STATCOM Facility system

8.1 The STATCOM building shall consist of control room, electrical room, meeting room (minimum size of 3 m x 5 m), battery room, valve and pump room, storage room, inert gas room, toilet room, and other rooms if necessary.

8.2 The valve room and pump room shall have the observe windows. The observe windows shall be designed by the Contractor with the minimum size of 1 m x 1 m.

All equipment within the valve room and pump room should be clearly seen via the observe windows.

8.3 The valve room and pump room are within the same room. They are separated by wire mesh fences. The entrance of the valve room and pump room shall be isolated.

8.4 Design, supply and installation of the STATCOM buildings 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. Recommendations for the aforesaid systems are as follows:

8.4.1 All cable wiring systems shall conform to NEC and IEC standards or other internationally accepted standards.

8.4.2 The lamps for the lighting system of the STATCOM building 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. The required intensity of the lighting installation shall be as Table 6.

AREA	LUX	REMARK
Around STATCOM building	50	weatherproof type
Control room	500	-
Meeting room	500	-
Electrical room	300	-
Battery room	300	Explosion proof type
Valve and pump room	300	Explosion proof type
Storage room	200	-
Inert gas room	200	-
Toilet room	200	-

Table 6: The intensity requirements for STATCOM building

8.4.3 The following areas of the STATCOM control building shall be with the emergency lighting:

- Control room
- Electrical room
- Battery room
- Stairway
- All exits

Emergency lighting system shall be installed at the STATCOM control building in case of normal station service fails. The said emergency

lighting system shall be activated and capable of generating illumination level of at least 150 lux for at least 3 hours.

8.4.4 As for the air ventilation system, the Contractor shall design and install the air ventilation system to serve the following areas:

- Battery room
- Valve & pump room
- Meeting Room
- Control Room
- Electrical Room
- Storage Room
- Toilet Room
- Inert gas room

Only the battery room shall be ventilated 24 hours a day continuously by 2 (two) categories of the explosion-proof exhaust fans operating alternately.

8.4.5 As for the air conditioning system, the Contractor shall design and install the air conditioning system to serve the following areas:

- Control Room
- Electrical Room
- Valve & Pump Room
- Meeting Room

The temperature inside the room shall not exceed 25ºC. The air conditioning system in the control room, the electrical room, and the valve & pump room shall operate 24 hours a day continuously and consist of 2 (two) categories of air conditioners for alternate operation.

8.4.6 As for the fire protection system, the Contractor shall design the fire protection system which mainly consists of a fire alarm control panel, smoke detectors for all rooms and under the raised floor, optic beam smoke detectors, heat detectors, annunciator, fire exit signs, line-typed heat detectors, and other related accessories required for a complete operation. The fire protection system shall conform to NEPA or other internationally accepted standards. A summary of the type and quantity of fire extinguishers required for the specified areas are given in the Table 7:

Area	Fire Extinguisher	
	Dry	Carbon
Control Room	-	4
Electrical Room	-	2
Valve & Pump Room	-	4
Storage Room	2	-
Around the building	2	-

Table 7: The type and quantity of fire extinguishers for STATCOM building

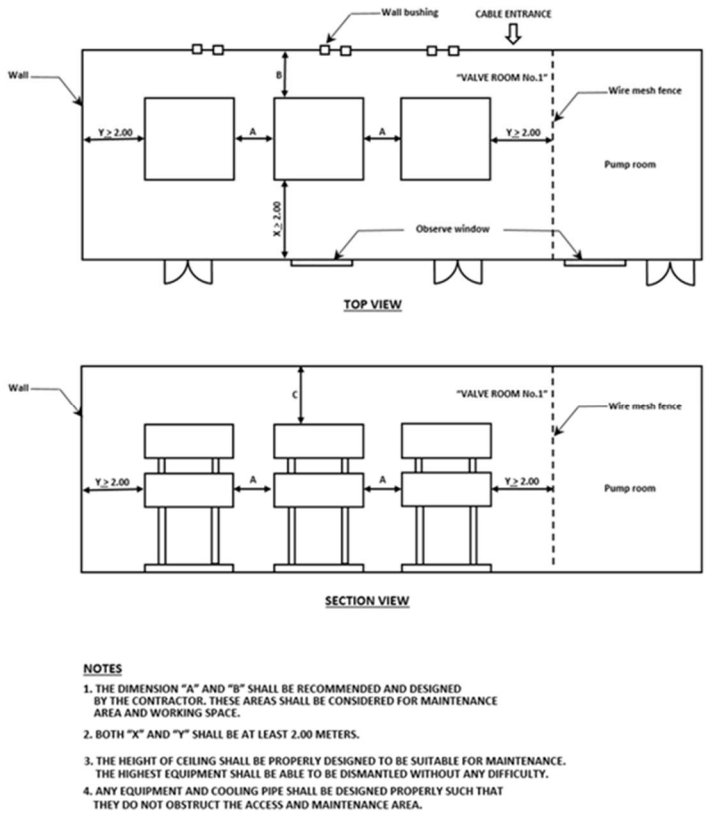
8.4.7 As for the indoor electrical system and communication system, the Contractor shall use standardized and cutting-edge equipment. The lighting fixture and installation detail shall conform to SE-FX-4-01. The indoor electrical system and communication system shall serve the as shown in Table 8.

AREA	Receptacle (QTY)		duplex RJ45 outlet (QTY)	
	Duplex	Floor	FOR LAN	FOR
Control Room	6	4	1	1
Meeting Room	2	-	1	1
Electrical Room	2	-	-	1
Valve & Pump Room	3	-	1	1
Storage Room	2	-	-	-
Inert gas Room	2	-	-	-

Table 8: The quantity of receptacle and outlet for STATCOM building

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

8.4.9 The maintenance area for pump room shall be designed to be suitable for maintenance and be able to dismantle without any difficulty. And the contractor shall design maintenance area in the valve room as following;



NOTES

1. THE DIMENSION "A" AND "B" SHALL BE RECOMMENDED AND DESIGNED BY THE CONTRACTOR. THESE AREAS SHALL BE CONSIDERED FOR MAINTENANCE AREA AND WORKING SPACE.
2. BOTH "X" AND "Y" SHALL BE AT LEAST 2.00 METERS.
3. THE HEIGHT OF CEILING SHALL BE PROPERLY DESIGNED TO BE SUITABLE FOR MAINTENANCE. THE HIGHEST EQUIPMENT SHALL BE ABLE TO BE DISMANTLED WITHOUT ANY DIFFICULTY.
4. ANY EQUIPMENT AND COOLING PIPE SHALL BE DESIGNED PROPERLY SUCH THAT THEY DO NOT OBSTRUCT THE ACCESS AND MAINTENANCE AREA.

Figure 3: Valve room design requirement for maintenance

8.5 Inverter for emergency lighting in the STATCOM building shall meet the requirement as shown in Table 9. Contractor shall be responsible for inverter sizing calculation and the calculation shall be submitted to EGAT for approval.

No.	Description	Requirement data	Unit
1	Environmental Condition		
	1.1 Minimum ambient temperature	0	Celsius
	1.2 Maximum ambient temperature	40	Celsius
	1.3 Relative Humidity	0 – 95	%
	1.4 Tropicalization	YES	-
	1.5 Altitude	< 1000	meters
2	Cabinet		
	2.1 Protection Level	IP 20	
	2.2 Mounting	Removable	
	2.3 Epoxy painting color	RAL7032	
	2.4 Convection ventilation	Forced air	
	2.5 Steel sheet thickness	1.5	mm.
3	Main supply Voltage		
	3.1 Nominal Voltage	125	V.
	3.2 Voltage variation	100 – 150	V.
	3.3 Permissible ripple voltage on DC	< 5	% Vp-p
	3.4 Self-precharge	YES	
4	Output AC Voltage		
	4.1 Nominal voltage	220	V.
	4.2 Supply system	1 ph+N	
	4.3 Static voltage regulation at 0-100% load variation and power factor 1.0	± 2	%
	4.4 Dynamic voltage regulation	± 5	%
	- At AC input fluctuation ± 10 %		
	4.5 harmonic distortion	< 5	% THD
	4.6 Output frequency	50	Hz
	4.7 Frequency variable	± 0.5	%
	4.8 Synchronized frequency	± 1	% Hz
5	Output capacity		
	5.1 Output continuous capacity Note xx : Design by Contractor	xx	kVA
	5.2 Overload capacity 100 % continuous	YES	
	5.3 Overload capacity 125 %	10	min
	5.4 Overload capacity 150 %	1	min
	5.5 Efficiency at rated load and 1.0 power factor	> 85	%

No.	Description	Requirement data	Unit
6	Control button		
	6.1 Inverter START and STOP	YES	
	6.2 Acknowledge alarm silent	YES	
	6.3 Lamp test	YES	
7	Measurement scale 90 degree		
	7.1 AC output voltage class 1.5	YES	
8	Protection		
	8.1 Overload shutdown	YES	
	8.2 Low DC voltage shutdown (< 105 V)	YES	
	8.3 AC output fuse to prevent short circuit current and overload	YES	
	8.4 Overload temperature shut down	YES	
	8.5 Thermistor fan controlled (Inverter will shut down when temperature exceed 70 Celsius)	YES	
	8.6 DC circuit breaker	YES	
	8.7 AC circuit breaker	YES	
	8.8 DC input fuse to prevent short circuit current and overload	YES	
9	Monitor		
	9.1 Input DC voltmeter	YES	
	9.2 Output AC voltmeter	YES	
10	Alarm and LED lamp status Indicator		
	10.1 Inverter ON/OFF	YES	
	10.2 DC input status	YES	
	10.3 Load on inverter	YES	
	10.4 LED lamp alarm indicators (Alarm noise shall not less than 75 db)	YES	
	10.5 AC output status (LED shall blink when Under/Over voltage +/- 10 %)	YES	
11	Cable entry		
	11.1 DC incoming	YES	
	11.2 AC Outgoing	YES	
	11.3 Terminal	INSIDE	

Table 9: Requirement of Inverter

8.6 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, one (1) lighting relay panels, raceways, and wiring cables for lighting circuits.

8.7 Design, supply and installation of a switchyard lighting system complete with all integral accessories to provide a complete system operation. The lighting system of fence lighting and access road lighting shall be LED (SOLAR panel with built in battery) and equipment

lighting shall be LED as per drawing no. LT-FX-0-03-01/01 and as per drawing no. LT-FX-0-02-01/01, respectively.

Area	Lux
STATCOM Area	50
Transformer Area	50
STATCOM Station Fence	10

Table 10: The intensity requirement for outdoor area

8.8 The size of the low-voltage cable shall be adequate to ensure that the voltage drop at the load point remains less than 5% under rated load current.

The voltage drop from the safety switch to the LCUS/AC board, and from the LCUS/AC board to the load, shall not exceed 2% and 3%, respectively.

The voltage drop shall comply with EGAT's requirements, and the voltage drop calculation must be submitted to EGAT for approval.

8.9 The contractor shall refer to DWG. No. SD-RB-0-01L & SD-RB-0-01M for guideline to design facility system of STATCOM building.

8.10 Design, supply, and installation of the equipment and hardware required to provide the installation of the GPS antenna and FRS antenna, and their cabling connection (in metallic conduits) to the associated panels in the control room.

9. Other works

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

9.2 Modification to Junction box supporting structure (JB001) for the installation of the safety switches.

9.3 Modification to Junction box supporting structure (JB003) for the installation of outdoor receptacle box (ORB) and common cubicle for maintenance (CCM).

9.4 Modification of 22 kV bus supporting structures (BS203) for installation of 22 kV XLPE cables, 22 kV cable terminations and 22 kV power fuses as indicated in Bidding documents.

9.5 Installation of suspension and post insulators and all hardware for suspension and post insulator assembly.

9.6 Supply and installation of the cabling work from the transformers to the marshalling cubicle and the associated equipment

9.7 Design, supply, and installation of identification plates for all equipment and other necessary plates.

9.8 Supply and installation of the labels or signs for indication the low voltage underground cable routes in case of the low voltage cables installed by direct burial method or run in conduit method.

9.9 The bidders shall submit these documents to EGAT for technical evaluation during Bid proposal review as follows;

1. Basic design report. The following topics shall be included but not limited to;
   - STATCOM basic design data
   - Single line diagram
   - V-I Characteristic (Primary and Secondary side of transformer)
   - Short circuit study
   - Summary of the data of STATCOM components used in the basic design report
   - Operating points summary table
   - Tolerances summary table for each operating point
   - Operating diagram of STATCOM
   - Summary table of normal and degraded modes (if applicable)
   - Fundamental rating study
   - Harmonic study including both harmonic performance and component rating
   - Current and voltage stresses (e.g. overvoltage)
   - Insulation coordination study
2. Drawings
   - Single line diagram (e.g. DWG. NO. CYP2-S-1) showing all components and their ratings
   - General layout of the substation (e.g. DWG.NO CYP2-S-7)
   - Layout of the STATCOM area including (service road, cable trench and etc.)
   - Layout of the STATCOM building (clearly showing the dimension and clearance to be checked with EGAT requirements)
3. Noise analysis report

   Criteria (at the measuring points along the substation boundary):

- The maximum permissible sound level including background noise level shall not exceed 90 dBA.
- The 24-hour average permissible sound level included background noise level shall not exceed 70 dBA and the increment at each measuring point shall not exceed 7 dBA.

4. Stress on the existing component report
   - Operating restriction shall be shown in this report (if any)
   - See scope of work for details

Note:

1. The bidders acknowledge that the bidders shall properly design the layout of STATCOM considering engineering practice and the maintenance of STATCOM components, when accessing to and taking component(s) in or out. If found later that it is not appropriate, the bidders shall be responsible for the correction work without additional cost and time.
2. The documents and drawings shall be prepared with high quality printing and the paper size shall be suitable for approval by EGAT.

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 of suspension insulators and post insulators in 230 kV substation.

CONTROL AND PROTECTION PART

Schedule 1 : 230 KV CHAIYAPHUM 2 substation

Work included in this Contract

1. Design, supply, installation, wiring, test and commissioning of the complete 230 kV control and protection system which comprises the following equipment:
   - Protective relay panel (swing-rack type).
   - 400/230 VAC distribution board.
   - Transducers and accessories.
   - Related accessory equipment which is required for interfacing between the new equipment and the existing equipment.
   - Cables and accessories as well as connection of cables among all of the boards and the associated equipment in order to complete the function of the 230 kV control and protection system.
2. Design, modification, wiring, test and commissioning of the existing 230 kV control and protection system which comprises at least the following equipment in order to incorporate the new equipment:
   - Protective relay panels (swing-rack type).
   - Capacitor bank control and protection panels.
   - Synchronizing panel.
   - Interposing relay panel.
   - Transducer panel.
   - Marshalling panel for the remote terminal unit.
   - Marshalling panel for the fault recording system.
   - Marshalling panel for control system.
   - Fault recording system panel.
   - Remote terminal unit panels.
   - 125 VDC distribution board.
3. Design of both schematic and wiring diagrams as well as wiring of the additional inputs to the existing Fault Recording System (FRS), including test and commissioning of the completed FRS.
4. Design of both schematic and wiring diagrams as well as wiring of the additional inputs and outputs to the existing Computerized Control System (CCS), including test and commissioning of the completed CCS.
5. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system including ACAD files of the said drawings.
6. Any modification and interfacing work to the existing control, metering and protection

panels including supply of related accessory equipment which is required for incorporating the new equipment, the modified existing drawings shall be performed by the Contractor and submitted to EGAT for approval. In addition, the ACAD files of the final drawings shall be submitted.

7. For removal of the unused existing cables, the removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

8. The Contractor shall provide the draftsman working at the site during the commissioning stage in order to be in charge of writing the as-built drawings of control and protection system.

Schedule 2 : STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

Work included in this Contract

1. Design, supply, installation, wiring, test and commissioning of the complete STATCOM No.2 control and protection system which comprises at least the following equipment:
   - STATCOM No.2 protection, metering and major control equipment, local control system (local HMI installed at STATCOM building), remote control system (remote HMI installed at existing control building) and protection relay panels.
   - A separate digital Fault Recording System (FRS) panel with its own GPS system and marshalling panel for FRS.
   - 400/230 VAC, 125 VDC distribution board and 125 VDC power panel.
   - Temperature transducer (T-TDR) for STATCOM No.2 building.
   - Interfacing panels installed at the existing control and relay buildings (ex. STATCOM marshalling panel installed at existing relay building) in order to conveniently interface as well as related accessory equipment which is required for interfacing between the STATCOM No.2 control and protection system and the existing control and protection system.
   - LAN switches and accessories which are necessary for connection to existing communication system as specified on DWG. No. TP-E-21.2.
   - Cables and accessories as well as connection of cables among all of the boards and the associated equipment in order to complete the function of the STATCOM No.2 control and protection system.
2. The separate FRS panel installed at STATCOM No.2 building shall have its own complete GPS system including outdoor antenna as well as GPS receiver and accessories which is used as a reference time base to FRS system.
3. The control coordination between the STATCOM No.2 and two (2) sets of the 72 MVAr existing capacitor bank (MSC) which are connected to the 230 kV feeder shall at least

   fulfill the following requirements:
   - The voltage change shall not exceed 2-3% according to IEEE Std 1036.
   - The proposed coordination shall be completely achieved through both the STATCOM No.2 local HMI and remote HMI, and shall also be enabled/disabled via SCADA.
   - The proposed coordination shall operate in accordance with the STATCOM No.2 output and shall not cause any damages to substation equipment.
   - The proposed coordination shall have two (2) logics by means of two (2) reactive power setting values for both slow and fast responses (delayed time setting) with regard to switch ON and switch OFF MSCs. Moreover, the reactive power setting values shall be recommended by the Contractor.

- The sequence of MSCs to be switched shall be selectable in order to avoid the capacitor bank limitation. Moreover, the switch counter of each MSC shall be shown on both the STATCOM No.2 local HMI and remote HMI.
- Each MSC shall have the capability to be controlled in manual mode (not to be controlled by STATCOM No.2).
- The interface signals between the STATCOM No.2 control system and each MSC shall at least be as follows:

Input signals (from MSC to STATCOM)	Output signals (from STATCOM to MSC)
- MSC status ON - MSC status OFF - MSC available	- ON command - OFF command

- The control and protection equipment for the existing MSCs including the 230 kV feeder to MSCs shall be modified in order to fulfill the said requirements. The Contractor shall be responsible for providing and installation additional control equipment as well as providing and wiring all interface cables among the existing MSCs, 230 kV feeder to MSCs and the STATCOM No.2 control system.

  The following data are for information:

  - Voltage of each capacitor unit: 6.9 kV
  - Discharged time of each capacitor unit: < 50 V within 5 minutes
  - Rated operating sequence of MSC breaker: O + 0.3s + CO + 15s + CO
  - MSCs can only be controlled via either STATCOM No.1 or STATCOM No.2 at any one time.

In addition, the design concept of the proposed coordination shall be submitted to EGAT during Bidding stage.

4. The STATCOM No.2 shall be completely designed to support connection from the existing STATCOM No.1. The details of connection points including CID files will be provided after the Award of Contract. Moreover, the STATCOM No.2 shall at least fulfill the following requirements:

- The communication between STATCOM No.2 and the existing STATCOM No.1 shall be achieved via IEC 61850 ed.2 protocol through their own STATCOM controllers. In case the IEC 61850 is not used in STATCOM No.2, the separate proper protocol converter shall be provided, and the performance of the converted signals shall be verified by the Contractor during the Factory Acceptance Test (FAT).
- The communication link between STATCOM No.2 and the existing STATCOM No.1 shall be done through multimode optical fiber cables. The Fiber Distribution Unit (FDU) shall be installed by the Contractor to provide interconnection between incoming multimode optical fiber cables and STATCOM No.2 equipment. The following items

shall be included in FDU:

- Snap-in plate with LC-type connectors for multimode optical fiber cable
- Splice tray
- Pigtail fiber optic cable

Optical fiber splices, fusion or mechanical joint shall not exceed a maximum optical insertion loss of 0.3 dB. Connection attenuation allowance is up to 0.75 dB/connection.

- The necessary interface signals for smooth collaboration between STATCOM No.2 and the existing STATCOM No.1 shall be provided by the Contractor. The signals shall at least adhere to the list outlined in IEC TR 61850-90-14:2021 as follows:

Input signals (from STATCOM No.1 to No.2)	Output signals (from STATCOM No.2 to No.1)
- Communication is healthy - Optimization request command - Optimization completed command - Optimization allowed feedback - Optimization prohibited feedback - STATCOM is ready for optimization	- Communication is healthy - Optimization requested command - Optimization completed command - Optimization allowed feedback - Optimization prohibited feedback - STATCOM is ready for optimization

Moreover, fault back strategies ,for example, feedback signals are not received in time, the grid voltage changes massively, etc., shall be implemented. The Contractor shall provide the manual showing the detailed connection points which can guide the Contractor of STATCOM No.1 to clearly map the signals. In addition, the interface signal list shall be submitted to EGAT during Bidding stage for initial consideration. Then, the said list will be finalized during Approval stage. The said interface signals shall be tested and verified by the Contractor during FAT by using Real Time Digital Simulator (RTDS) to simulate other STATCOM controllers.

- The interface signals shall be configurable on both STATCOM No.2 local HMI and remote HMI. However, one (1) portable data storage device containing CID files of controller/converter and the necessary licensed configuration software shall be delivered to EGAT at the completion.
- The STATCOM No.2 shall have capability to optimize its own response control speed in order to avoid counteracting the existing STATCOM No.1. Gain test (if any) shall be cyclically performed to validate the dynamic response and STATCOM control setting when the existing STATCOM No.1 is switched in service and out of service.
- The STATCOM No.2 shall be capable of prioritizing with the existing STATCOM No.1 to ensure control coordination with the existing MSCs. However, only one (1) STATCOM shall have permission to control at any one time.

5. The STATCOM No.2 system shall be capable of interfacing to EGAT's SCADA system which consists of local SCADA and remote SCADA. In addition, remote SCADA shall

comprise at least National Control Center (NCC), Backup National Control Center (BNCC), Regional Control Center (RCC) and Group Control Center (GCC). However, only one (1) control center shall be active at any one time.

6. A smooth energizing of the STATCOM No.2 shall be achieved and shall not affect the existing STATCOM No.1, EGAT's customers or cause any malfunctions to the nearby power plants. In addition, the proposed STATCOM No.2 design shall demonstrate that it fulfills the said requirements.
7. The STATCOM No.2 control system shall be designed with the optimized parameters and functions in order to fulfill all conditions under the given short circuit level.
8. The real time status of the STATCOM No.2 configuration including the related existing 230 kV configuration shall be shown on both STATCOM No.2 local HMI and remote HMI.
9. The Contractor shall be responsible for providing, installing as well as wiring the necessary cables and equipment which are required to fulfill the STATCOM No.2 Power Oscillation Damping (POD) function. Moreover, the POD function shall be provided on both STATCOM No.2 local HMI and remote HMI, and shall also be enabled/disabled via SCADA.
10. The Contractor shall develop the STATCOM No.2 digital model which is compatible with DIgSILENT PowerFactory software starting from version 2021 (build 21.0.3.0), as well as the latest version. The said STATCOM No.2 digital model shall comprise as follows:

    - <u>The STATCOM No.2 model in Root Mean Square (RMS) time domain simulation:</u> this model is at least used for the STATCOM No.2 dynamic behavior studies and power flow analysis.
    - <u>The STATCOM No.2 model in ElectroMagnetic Transients (EMT) time domain simulation:</u> this model is at least used for harmonic studies and the STATCOM No.2 dynamic behavior studies during transient phenomena e.g. switching, fault, etc.

    The said STATCOM No.2 digital model shall at least include the complete data for the main circuit components, configurations, function block diagrams along with the parameters, input and output variables of each function block along with their scale factors as well as flow charts and logic diagrams of the entire control features. The control and protection functions shall at least be as follows:

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

    Moreover, the necessary parameters for the said STATCOM No.2 control and protection functions to input the STATCOM No.2 operating point as well as the necessary parameters for the external grid e.g. short circuit level, nominal voltage, nominal frequency, etc. shall be accessible and adjustable.

    The performance of the said STATCOM No.2 digital model for both step test and scenario test shall be verified by comparing to the corresponding FAT results from RTDS which shall

be the responsibility of the Contractor. The said comparison report shall be submitted to EGAT for approval before commissioning. The scenarios which will be provided after the Award of Contract are as follows:

- For the STATCOM No.2 model in RMS time domain simulation, maximum ten (10) scenarios on one (1) AC reduced network which has minimum short circuit level.
- For the STATCOM No.2 model in EMT time domain simulation, maximum ten (10) scenarios on one (1) AC reduced network which has minimum short circuit level.

Five (5) copies of portable data storage device containing the said final STATCOM digital model and the details of the modified parameters in case there are some improvements during commissioning shall be delivered to EGAT at the completion.

11. The studies of control interaction between STATCOM No.2 control system, coordinated MSCs and the existing STATCOM No.1 shall prove that there is no negative result to EGAT's system. EGAT shall have access to all data necessary for complete understanding of the studies as well as the validity of the results.

    Unless otherwise specified, the said control system studies shall be done by the offline simulation and shall be studied based on the existing STATCOM No.1 model data and the given four (4) AC reduced networks in DIgSILENT PowerFactory format which will be provided after the Award of Contract.

    In case there are different formats between the data used in the studies and the given data, the verification reports shall be done by the Contractor and submitted to EGAT for approval. Moreover, the STATCOM No.2 voltage reference range of continuous operation as shown on Ratings and Features shall be comprehensively considered in the said control system studies.

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

    - Study cases.
    - All used data such as parameters, equations, standards, tools, and etc.
    - Study methods.
    - Study results such as interested variables shown in time-domain simulation.
    - Conclusion.

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

    - POD function
      This study is to design the STATCOM No.2 POD controller and find out the proper setting values for which the effects of the POD controller of other FACTS devices and other power system stabilizer of nearby generators are properly considered. The STATCOM No.2 POD function and its performance shall be tested and verified using RTDS during FAT. In addition, the maximum ten (10) scenarios per each AC reduced network for the study will be provided after the Award of Contract.
    - Gain test (if any)
      This study is to confirm the proper control setting under the following 3 scenarios:
      - STATCOM No.1 is in service ***including degraded mode:*** to confirm the proper coordination between both STATCOMs.

- STATCOM No.1 is out of service: to verify that the control setting of STATCOM No.2 is robust enough to maintain system stability and the required dynamic response when the existing STATCOM No.1 is outage.
- STATCOM No.1 is restored: to confirm the system response returns to the desired STATCOM No.1 is in service state as specified above.

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

12. For STATCOM No.2, the Contractor can follow their own cable identification standard. However, the cables for the following circuits shall be named with additional EGAT subscriptions for safety during maintenance.

    - Q for current circuits
    - V for voltage circuits
    - DC for DC supply circuits
    - AC for AC supply circuits

    In addition, the Contractor's cable identification standard shall be described in the interconnection wiring diagram. For the connection between the existing 230 kV system and the STATCOM system, the cable identification shall follow EGAT standard.

13. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection system including ACAD files of the said drawings.

14. Any modification and interfacing work to the existing control, metering and protection panels including supply of related accessory equipment which is required for incorporating the new equipment, the modified existing drawings shall be performed by the Contractor and submitted to EGAT for approval. In addition, the ACAD files of the final drawings shall be submitted.

15. For removal of the unused existing cables, the removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

16. The Contractor shall provide the draftsman working at the site during the commissioning stage in order to be in charge of writing the as-built drawings of control and protection system.

Remark :

1. Metering and relaying diagram on drawings nos. CYP2-E-1.2 and TP-E-21.1 are used as guideline. The said drawings can be modified by the Contractor. However, they shall be submitted to EGAT for approval.

2. Two (2) cores of the CT QZ4A and QZ4B are supplied by EGAT for the STATCOM No.2 control and protection system.

CIVIL AND ARCHITECTURAL PART

Schedule 1 : 230 KV CHAIYAPHUM 2 substation

Work included in this Contract

CIVIL WORK

1. Design and construction of
   - 1.1 Steel structure and foundations for Specified equipment and the others not shown in "For Construction drawings" and / or EGAT's specification.
     - 1.1.1 22kV XLPE Cable with cable cleat and steel cover.
   - 1.2 Road and drainage system.
   - 1.3 Drainage system for cable trench.
2. Construction of
   - 2.1 Steel support structure foundation.
   - 2.2 Take-off foundation.
   - 2.3 Equipment structure foundation with sub trench (if required).
   - 2.4 Transformer loading.
   - 2.5 Cable trench.
   - 2.6 RC. Road.
   - 2.7 Crushed rock surfacing.
   - 2.8 Wire mesh fence.
   - 2.9 Site office.
   - 2.10 Lamp post for fence and access road lighting LED type foundation.
3. The drawings and calculation of all buildings shall be verified with adequate details for intended application and submitted to EGAT for approval.
4. All design works and the fabrication drawings for all steel structures shall be submitted to EGAT for approval.
5. All design, construction and testing shall be in accordance with Specification No.3001 : Civil and Architectural Work.
6. EGAT's Soil Investigation Report shall be submitted to the Contract after award of contract. If Soil Investigation Report affects foundation design (as shown in Price Schedule), the consequent works can be additional/deductive work.
7. EGAT's Soil Investigation Report (attached to the Contract) which was conducted prior to the site preparation work 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. All foundations shall be as specified in layout drawing. Except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.
9. Dynamic load test (DLT) according to ASTM D4945-89 shall be applied to at least 2% of driven piles (if driven pile type is required) except for driven pile of fence and lamp post.

10. Seismic load test (sonic integrity test) according to ASTM D5882-96 shall be applied to all bored piles (if bored pile type is required).
11. Plate bearing test according to ASTM D1194-94 shall be submitted to EGAT for approval.(if pad type foundation is required).
12. The Contractor shall remove all debris from construction material and other works in order to make the site clean and be in the condition acceptable to EGAT.
13. 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 sq.m for office area, 24 sq.mfor conference room which shall both be air-conditioned and 4 sq.m for toilet. The Contractor shall supply two(2) sets of facilities specified in section G-3, please ensure that each item is provided in double quantity (e.g., six sets of desks and chairs, two refrigerator)

Work not included in this Contract.

1. Supply of spare grass and weed killer and accessories. (Specification 3001-4.2.4)

Schedule 2 : STATIC SYNCHRONOUS COMPENSATOR (STATCOM)

Work included in this Contract

ARCHITECTURAL WORK

1. Design and construction of
   1.1. Static Synchronous Compensator (STATCOM) Building.
      1.1.1 Architecture of the whole building.
      1.1.2 The contractor shall construct the building in accordance with "IEEE STD-979-1994 (R2004)" (IEEE Guide for Substation Fire Protection).
      1.1.3 STATCOM Building shall be designed with reference to Chaiyaphum 2 Substation Dwg.No.CYP2-SVS-0-02A. The size of building, equipment layouts and cable block out shall conform to electrical drawing Dwg.No.CYP2-S-2 and Dwg.No.CYP2-S-6. Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work. The floor of STATCOM Building shall be elevated for 2.50 meters from the original ground level.
      1.1.4 The building shall be designed with at least two(2) entrances and exits.
      1.1.5 Entrances and exits of the building shall include a loading platform and reinforced concrete staircase with a minimum width of 1.2 meters, equipped with stainless handrails.
      1.1.6 The building shall include a ladder with a guard rail for roof access.
      1.1.7 The building shall be designed with hallways that provide access to every room.
      1.1.8 The CDU area shall be designed to allow installation of the CDU on a reinforced concrete floor, with aluminum grills that can be opened for maintenance.

1.1.9 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.

1.1.10 For exterior surface of the building, there shall be at least 20% of total building area which uses yellow color that represents corporate image of EGAT.

1.1.11 Building facilities

- Electricity and illumination system including cable work for illumination, ventilation system, power supply, air conditioning system, and telephone system.
- Plumbing system for water supply, building drain and vent, storm water drainage including sanitary wares and fittings.
- Miscellaneous including grounding and labeling.
- Cable routing and cable support (cable tray and cable ladder) installed in cable room and main cable trench.
- Hoist crane, for loading area, of lifting capacity not less than 2 metric tons and wireless crane remote control.
- Furniture as specified in Architectural Drawings not included in this contract.
- Signboard on building and room name sign on each room.
- Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).

WATER SUPPLY AND FIRE PROTECTION SYSTEM

1. Design and construction of

1.1 Fire protection system for STATCOM Building.

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

1.1.2 Total Flood Clean Agent Fire Suppression System shall be installed in Valve and Pump Room, Control Room, Electrical Room, Battery Room and Inert Gas Room.

1.1.3 Fire protection system of STATCOM 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 an existing Control Building. The installation practice shall be in accordance with the last edition of NFPA 72.

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

1.1.5 For system requirements for indoor fire protection system, 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 / heat detector and a zone C of all ASD shall be crossed or two zone of A and B are crossed.

1.1.6 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.
- 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

1.1.7 There shall be one control panel which controls fire detection system and IG-100 fire suppression system in the building.

1.1.8 For all zones of IG-100 protected zone shall have disconnect switch for maintenance.

1.1.9 Battery room shall be furnished with an all-stainless steel, wall-Mounted emergency eyewash. Contractor shall submit the catalog and proposed location of the eyewash to EGAT for approval.

1.2 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.

1.3 Fire protection system for the Transformer : The Foam-water spray system shall comply with the following;

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

1.3.2 Foam concentrate shall be non-fluorine type.

1.3.3 Bladder tank vessel construction standards : Carbon steel to ASME code section VIII for unfired pressure vessel.

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

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

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

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

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

1.3.9 There shall be one control panel, for fire detection and foam/water spray system, which controls all foam/water spray system for each series of KTX protected transformers.

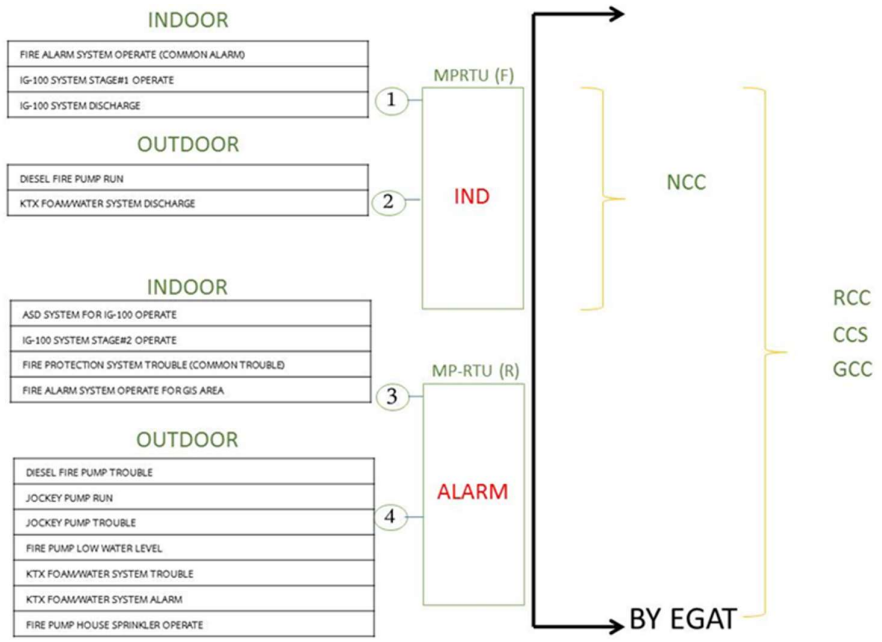
1.3.10 Each transformer shall have disconnect switches for maintenance.

1.4 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.

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

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.

1.7 For fire protection system monitoring system, contractor shall be responsible for procuring and installing a system comprising of monitoring and automatic alarm equipment; and for connecting the system to EGAT SCADA using Protocol Modbus or other Protocols that EGAT supports via TCP/IP port RJ45. When detectors detect smoke or heat, or equipment abnormality occurs, or fire protection system operates, the monitoring system will send alarm signals and record the even location, event date, start time, end time, and other necessary information. The event log must be appropriate for analyzing the cause of the event. The signals shall be verifiable and sent through (CCS) RTU and EGAT SCADA to NCC (National Control Center). The equipment shall be installed in control building or other location specified by EGAT. 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;



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

1.9 Water supply system.

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

1.11 Portable fire extinguisher

1.12 There shall be safety signs for fire extinguisher, manual release station and fire alarm device.

1.13 Contractor shall warranty the fire protection system for two full years starting the date after contract final completion. Fire protection system shall be inspected and maintained for 2 years, not less than 4 times per year and not less than manufacturers' recommendation, at contractor's cost and expense.

1.14 Notwithstanding the expiration of any warranty period described in this contract, the warranty period for any fire protection system or equipment and maintenance period shall be extended by a period equal to the sum of any periods during the warranty period when such system or equipment cannot be used for the purposes for which they were intended or the delays in maintenance, starting from the date EGAT has given contractor notice.

1.15 Consumable materials and backup batteries for fire protection system, for example, filters, liquids, and seals shall be provided according to manufacturer's instructions for a period of two years.

1.16 For all buildings, piping or cable penetrating the wall/floor and block out at wall/floor shall be enclosed with fire stop material. Fire stop material shall be approved by UL Listed/FM Approved and comply with NFPA 80 (Standard for Fire Doors and Other Opening Protectives) and other relevant standards. The installer shall be certified by manufacturer and have experience in installation of material for at least 5 years, of at least 10 projects.

1.17 All firestops for penetration from outside cable trenches to cable room and from cable room to under raised floor area shall be multi cable transit with galvanized steel frame fire stop. Other firestops shall be block type being able to be removed and reinstalled conveniently. Firestop catalog and installation detail drawings shall be submitted to EGAT for approval. The cables penetrating from outside the building into building shall be coated with firestop cable coating with the length of 50 cm. measuring from building's exterior wall outward.

1.18 Fire detection devices in substation shall be as table below.

Protected Area	Detector
1. Control, Relay, Telecommunication and Valve Rooms	ASD and SD
2. Under-Raised Floor	ASD and SD
3. Feeder Sections and Switchgear Areas	ASD and SD
4. Electrical Room	ASD and SD
5. Battery room	
5.1 Battery room Vented Type	HD
5.2 Battery room Dry Type	HD
6. GIS Area	OBSD
7. Inert Gas Room	SD
8. Other Room such as Shops, Office, Warehouse and Pantry	HD or SD
9. Emergency Diesel generator room or Emergency Generator Set House	HD
10. Transformer, Shunt Reactor	LHD
11.Cable Spreading Rooms and Cable Tunnels	▪ SD when environmental condition is acceptable. ▪ LHD when environmental condition is out of range for SD ▪ ASD in high risk area and required early response.
12. Main Cable Trench of GIS Area	LHD
13. Warehouse	OBSD
14. Cable room	ASD and SD

Abbreviations
1. Heat detector, HD
2. Addressable Spot-Type Photoelectric Smoke detector, SD
3. Linear Heat Detector, LHD
4. Aspirated smoke detectors, ASD
5. Optical beam smoke detector, OBSD

1.19 Pipe coating system shall conform to ASME A13.1 standard and ANSI-A13.1

1.20 Underground water piping shall have indicator sign.

1.21 For Fire protection system design shall be conformed to NFPA 101 (Life Safety Code).

1.22 All junction boxes or electrical equipment in rooms on ground floor shall be 1.2 m higher from room floor elevation.

1.23 There shall be stainless steel flexible connector for fire fighting Pipe and foam solution pipe when penetrating through buildings' wall. The flexible joint axial movement shall not less than 5 cm.

1.24 There shall be insect screen for all louver of foam house.

1.25 The roller shutter door of foam house shall be Rolling Shutter Door with Solid Blades.

1.26 There shall be sunshade for outdoor equipment of deluge system.

1.27 The new fire protection system monitoring system shall be connected to the existing computer for fire protection system in control room. When detectors detect smoke or heat, or equipment abnormality occurs, or fire protection system operates, the monitoring system will send alarm signals and record the event location, event date, start time, end time, and other necessary information. The event log must be appropriate for analyzing the cause of the event.

2. Construction of

2.1 Cabinets with 2x50 lbs wheel fire extinguisher.

CIVIL WORK

1. Design and construction of

1.1 Steel structure and foundations for Specified equipment and the others not shown in "For Construction drawings" and / or EGAT's specification.

1.1.1 Transformer foundation with oil containing pit.
1.1.2 Cable tray for transformer, underground cable in HDPE duct.
1.1.3 22kV Distribution transformer foundation
1.1.4 22kV Load break switch foundation.
1.1.5 Fire wall.
1.1.6 Outdoor marshalling common control cubicle foundation.
1.1.7 Lighting relay panel foundation

1.2 Transformer loading.

1.3 Foam house.

1.4 Road and drainage system.

1.5 Drainage system for cable trench.

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

1.7 Oil separator. The contractor shall make an Oil separator design calculation in accordance with "IEEE STD-979-1994 (R2004)" (IEEE Guide for Substation Fire Protection), "IEEE STD-980-1994 (R2001)" (IEEE Guide for containment and control of oil spills in substation) and "Wastewater Quality Standard" of Pollution Control Department, Ministry of Natural Resources and Environment.

1.8 STATCOM Area.

1.8.1 Steel structure foundation.
1.8.2 Equipment structure foundation with sub trench (if required).
1.8.3 Road and drainage system.
1.8.4 Drainage system for cable trench.
1.8.5 Water supply system.
1.8.6 Fire protection system.
1.8.7 Cable trench.
1.8.8 XLPE Cable with cable cleat and steel cover.
1.8.9 Crushed rock surfacing.
1.8.10 Fence.

1.8.11 Lamp post.

1.8.12 For STATCOM Area, all reinforced concrete structures, foundations and steel structures shall be designed and constructed to avoid the magnetic field, which may damage the structure. If not required, the contractor shall submit supporting documents from the manufacturer to EGAT for approval. However, it is the contractor's responsibility for any subsequent issues or damages.

1.8.13 For foundation in STATCOM Area. All material reinforcement shall prevent effect from the magnetic induces that can heating the material reinforcement which may damage the RC structure.

1.8.14 For STATCOM Area, Switchyard should be RC slab instead of soil expose. (All material reinforcement shall prevent effect from the magnetic induces which may damage structure.)

2. Construction of

   2.1 Crushed rock surfacing.

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

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

5. All design, construction and testing shall be in accordance with Specification No.3001 : Civil and Architectural Work.

6. EGAT's Soil Investigation Report shall be submitted to the Contract after award of contract. If Soil Investigation Report affects foundation design (as shown in Price Schedule), the consequent works can be additional/deductive work.

7. EGAT's Soil Investigation Report (attached to the Contract) which was conducted prior to the site preparation work 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. All foundations shall be as specified in layout drawing. Except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.

9. The Contractor shall perform a static load test for STATCOM Building foundations in accordance with ASTM D1143 (if pile type foundation is required).

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

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

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

<u>Work not included in this Contract.</u>

1. Supply of spare grass and weed killer and accessories. (Specification 3001-4.2.4)