

REGISTRATION FORM

INVITATION TO BID NO. TILS-S-01

FOR SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)

AND EXPANSION OF 230 KV THUNG SONG SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

AVAILABLE DURATION FOR PURCHASING October 29, 2018 TO November 30, 2018

PRICE USD 256.- OR THB 8,000.-

COMPLETE DATA IS REQUIRED FOR THE BIDDER'S OWN BENEFITS

(โปรดกรอกรายละเอียดให้ครบถ้วนเพื่อประโยชน์ของบริษัท)

Step 1 : Fill out this Registration Form in English (Typing is preferred)

Step 2 : Submit this form for payment at Receivable Cashier Section (1st Floor, TOR 100 Bldg., Counter 4-8) Tel no. 02 436 5512

Step 3 : Bring the payment receipt and the copy of filled-out Registration Form to receive the bidding documents at International

Procurement Department - Transmission Segment (Room No. 1202/2, 12th Floor, Building Tor. 101) Tel no. 02 436 0241-42

FOR PURCHASER				TAX ID :	
NO.	RECEIPT NO. :	DATE :	PURCHASER (ผู้ซื้อ):		
BIDDER'S NAME (บริษัทผู้ซื้อเอกสาร)					
ADDRESS (ที่อยู่)				COUNTRY :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:		TEL.:	
E-mail :		e-GP Registration Date :			
LOCAL REPRESENTATIVE (ตัวแทนในประเทศ)					
ADDRESS (ที่อยู่)				TAX ID :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:		TEL.:	
E-mail :					
FOR PROCUREMENT OFFICER		CHANGE OF BIDDER'S NAME		TAX ID :	
NEW BIDDER'S NAME (ชื่อผู้ซื้อเอกสารเปลี่ยนเป็น)					
ADDRESS (ที่อยู่)				COUNTRY :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:		TEL.:	
E-mail :					
LOCAL REPRESENTATIVE (ตัวแทนในประเทศ)					
ADDRESS (ที่อยู่)				TAX ID :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:		TEL.:	
E-mail :		e-GP Registration Date :			
FOR PROCUREMENT OFFICER		FOR PURCHASER			
Procurement Officer (ผู้ส่งมอบเอกสาร)		Document received by (ผู้รับมอบเอกสาร)			



INVITATION TO BID NO. TILS-S-01
SUPPLY AND CONSTRUCTION OF 500 kV THUNG SONG SUBSTATION (GIS)
AND EXPANSION OF 230 kV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION
TO ENHANCE SYSTEM SECURITY

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 : Thung Song Substation

Medium Cost (including Value Added Tax and other expenses) : THB 961,000,000.-

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 Office of Prime Minister and/or in the Debarment List and/or in the List of Work Abandoners declared by EGAT.
2. The Bidder shall neither fail to submit the Revenue and Expense Accounts nor fail to present proper and complete accounts under the Notification of National Anti-Corruption Commission Concerning Principles and Methods of Preparing Revenue and Expense Accounts of Project between Individual/Company and Government Agencies B.E. 2554 (A.D. 2011) issued on August 11, 2011 as amended from time to time ("the Notification").
3. The Bidder shall register for e-Government Procurement (e-GP) at Thai Government Procurement website (www.gprocurement.go.th at telephone No. 66 2127 7386 – 89) of the Comptroller General's Department of Thailand.
4. 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.
5. 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.
6. 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.
7. 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.
8. The Bidder shall sign Integrity Pact Agreement for Cooperation to Prevent and Abstain from Corruption on Procurement of Electricity Generating Authority of Thailand to be submitted on the bid opening date.

Nilanate Osotpavapost

Availability of Bidding Documents

Bidding Documents in CD-ROM will be available for examination of Bidder's Qualifications and purchase during 8:00 hrs. to 15:00 hrs., Bangkok Standard Time, as from October 29, 2018 to November 30, 2018 at USD 256.- or THB 8,000.- per copy, non-refundable, at the following address :

International Procurement Department - Transmission Segment
(Room No. 1202/2, 12th Floor, Building Tor. 101)
Procurement and Inventory Management Division
Electricity Generating Authority of Thailand
Bangkruai, Nonthaburi 11130, Thailand
Telephone no. 66 2436 0242
E-mail : procurement.tse@egat.co.th

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

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

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

Delivery of Bids

Bids shall be submitted at Room No. 1202/1, 12th Floor, Building Tor. 101 during 9:30 hrs. to 10:00 hrs., Bangkok Standard Time, January 16, 2019 and will be opened publicly at 10:00 hrs.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

October 22, 2018

Nilanate Osotpavaposit

(Mrs. Nilanate Osotpavaposit)

Chief, International Procurement Department -
Transmission Segment



ประกาศการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เรื่อง ประกวดราคาจ้าง เลขที่ TILS-S-01

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย (กฟผ.) มีความประสงค์จะจัดหาและจ้างก่อสร้างสถานีไฟฟ้าแรงสูง 500 kV ท่งสง (GIS) และจ้างปรับปรุงและขยายสถานีไฟฟ้าแรงสูง 230 kV ท่งสง สำหรับโครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคใต้ตอนล่าง เพื่อเสริมความมั่นคงระบบไฟฟ้า โดยทำสัญญาแบบปรับราคาได้ (ค่า k) โดยใช้งบประมาณ กฟผ.

สถานที่ก่อสร้าง : สถานีไฟฟ้าแรงสูงท่งสง

ราคากลาง (รวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ) : 961,000,000.- บาท

คุณสมบัติของผู้เสนอราคา

1. ต้องเป็นนิติบุคคลผู้มีอาชีพรับจ้างตามประกวดราคาจ้างดังกล่าว และต้องไม่เป็นผู้ที่ทำงานซึ่งสำนักนายกรัฐมนตรีได้แจ้งเวียนชื่อไว้ หรือต้องไม่เป็นผู้ที่ กฟผ. ห้ามติดต่อหรือห้ามเข้าเสนอรราคา หรือต้องไม่เป็นผู้ที่ได้รับผลของการสั่งให้นิติบุคคลหรือบุคคลอื่นเป็นผู้ทำงานตามคำสั่ง กฟผ.
2. ต้องไม่อยู่ในฐานะเป็นผู้ไม่แสดงบัญชีรายรับรายจ่าย หรือแสดงบัญชีรายรับรายจ่ายไม่ถูกต้องครบถ้วนในสาระสำคัญ ตามประกาศคณะกรรมการป้องกันและปราบปรามการทุจริตแห่งชาติ เรื่อง หลักเกณฑ์และวิธีการจัดทำและแสดงบัญชีรายการรับจ่ายของโครงการที่บุคคลหรือนิติบุคคลเป็นคู่สัญญากับหน่วยงานของรัฐ พ.ศ. 2554 และที่แก้ไขเพิ่มเติม
3. ต้องเป็นนิติบุคคลที่ได้ลงทะเบียนในระบบอิเล็กทรอนิกส์ (e-Government Procurement : e-GP) ของกรมบัญชีกลางที่เว็บไซต์ศูนย์ข้อมูลจัดซื้อจัดจ้างภาครัฐ (www.sprocurement.go.th) โทรศัพท์ หมายเลข 0 2127 7386 – 89
4. ต้องไม่เป็นผู้มีผลประโยชน์ร่วมกันกับผู้เสนอราคารายอื่น ณ วันประกาศประกวดราคาครั้งนี้เป็นต้นไป หรือต้องไม่เป็นผู้กระทำการอันเป็นการขัดขวางการแข่งขันราคาอย่างเป็นธรรมในการดำเนินการประกวดราคาครั้งนี้
5. ต้องไม่เป็นที่ปรึกษาของ กฟผ. หรือมีส่วนร่วมในบริษัทที่ปรึกษาของ กฟผ. ในงานนี้ หรือต้องไม่มีผู้ปฏิบัติงาน กฟผ. เข้าไปมีส่วนร่วมในกิจการของผู้เสนอราคา ไม่ว่าจะในฐานะผู้ถือหุ้นที่มีสิทธิควบคุมการจัดการ กรรมการ ผู้อำนวยการ ผู้จัดการ พนักงาน ลูกจ้าง ตัวแทนหรือที่ปรึกษา ยกเว้น ในกรณีที่ผู้ปฏิบัติงานได้รับคำสั่งอย่างเป็นทางการจาก กฟผ. ให้ไปปฏิบัติงานหรือเข้าร่วมในกิจการของผู้เสนอราคา
6. ต้องไม่เป็นผู้ได้รับเอกสิทธิ์หรือความคุ้มกัน ซึ่งอาจปฏิเสธไม่ยอมขึ้นศาลไทย เว้นแต่รัฐบาลของผู้เสนอราคาได้มีคำสั่งให้สละสิทธิ์และความคุ้มกันเช่นนั้น
7. ผู้ประสงค์เข้าประกวดราคาในนามของกิจการร่วมค้า (Joint Venture or Consortium) จะต้องดำเนินการทุกขั้นตอนของการประกวดราคา ในนามของกิจการร่วมค้าตั้งแต่การเสนอรราคาจนสิ้นสุดข้อผูกพันกับ กฟผ.
8. ต้องเป็นนิติบุคคลที่ได้ลงนามในข้อตกลงคุณธรรมความร่วมมือป้องกันและต่อต้านการทุจริตในการจัดซื้อจัดจ้างของ กฟผ. และเสนอมาในวันเปิดซองประกวดราคา

ท่งสง ๒๐๑๙

การขายเอกสารประกวดราคา

ผู้สนใจติดต่อขอทราบรายละเอียด เพื่อตรวจสอบคุณสมบัติของผู้เสนอราคา และขอซื้อเอกสารประกวดราคา ในราคา ชุดละ 8,000.- บาท ได้ที่ แผนกจัดจ้างต่างประเทศสายงานระบบส่ง (ห้อง 1202/2 ชั้น 12 อาคาร ท.101) กองจัดซื้อจัดจ้าง ต่างประเทศสายงานระบบส่ง ฝ่ายจัดซื้อจัดจ้างและบริหารพัสดุ การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เชียงสะพานพระราม 7 จังหวัดนนทบุรี ในวันทำการระหว่างเวลา 08:00 น. ถึง 15:00 น. ตั้งแต่วันที่ 29 ตุลาคม 2561 ถึงวันที่ 30 พฤศจิกายน 2561 หรือสอบถามทางโทรศัพท์ หมายเลข 0 2436 0242 หรืออีเมล procurement.tse@egat.co.th ทั้งนี้ สามารถ download แบบฟอร์มลงทะเบียนผู้ซื้อเอกสาร ประกวดราคาได้ที่เว็บไซต์ <http://www4.egat.co.th/fprocurement/biddingeng/>

การยื่นซองประกวดราคา

กำหนดยื่นซองประกวดราคา ในวันที่ 16 มกราคม 2562 เวลา 9:30 น. ถึง 10:00 น. และเปิดซองประกวดราคาเวลา 10:00 น. ณ ห้อง 1202/1 ชั้น 12 อาคาร ท.101 การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เชียงสะพานพระราม 7 จังหวัดนนทบุรี

ประกาศ ณ วันที่ 22 ตุลาคม 2561

นิงเนาะ โองงอดูมิ

(นางนิลเนตร โอสถภาณุชิต)

หัวหน้ากองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง

**ตารางแสดงวงเงินงบประมาณที่ได้รับจัดสรรและราคากลาง(ราคาอ้างอิง)
ในการจัดซื้อจัดจ้างที่มีไขงานก่อสร้าง**

1. **ชื่อโครงการ** ประกวตราคาเลขที่ TILS-S-01
งานจัดหาและจ้างก่อสร้างสถานีไฟฟ้าแรงสูง 500 kV สฟ.ทุ่งสง (GIS)
และจ้างปรับปรุงและขยายสถานีไฟฟ้าแรงสูง 230 kV สฟ.ทุ่งสง
โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคใต้ตอนล่าง เพื่อเสริมความมั่นคงระบบไฟฟ้า
/หน่วยงานเจ้าของโครงการ ฝ่ายแผนงานและโครงการระบบส่ง การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย
2. **วงเงินงบประมาณที่ได้รับจัดสรร**
โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคใต้ตอนล่าง เพื่อเสริมความมั่นคงระบบไฟฟ้า
งบประมาณ 35,400 ล้านบาท
3. **วันที่กำหนดราคากลาง** 27 กันยายน 2561 (วันที่ รวพส. โดย ชพสว. อนุมัติ)
ราคารวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ เป็นเงิน 961,000,000.00 บาท ราคา/หน่วย ตามเอกสารแนบ
4. **แหล่งที่มาของราคากลาง** หลักเกณฑ์การกำหนดราคากลางงานจัดซื้อจัดจ้างสายงานพัฒนาระบบส่ง
5. **รายชื่อเจ้าหน้าที่ผู้กำหนดราคากลาง**

5.1 นางสาววิลาวัลย์	ต้นวีระ	ทสอ-พส. กวอ-พส.
5.2 นางสาววิภาสิริ	ฉัตรพทุธรักษา	ทมพ-พส. กวอ-พส.
5.3 นายสุริยะ	ปรงขวัญเมือง	ทสพ-พส. กวอ-พส.
5.4 นางรัมภา	สุนทรินทุ	กวย-พส.
5.5 นายเมธา	รักปาน	กวป-พส.
5.6 นางสาวอุบลรัตน์	ต้นเกต	กวส-ส. อรส.

หมายเหตุ ค่าใช้จ่ายอื่นๆ ได้แก่ ค่าใช้จ่ายที่ กฟผ. ต้องจ่ายตามวิธีการพิจารณาเปรียบเทียบราคาที่กำหนดไว้
ในเอกสารประกวดราคา เช่น อากรขาเข้า เป็นต้น

On

วัลลภา ชิวชนากรณ์กุล

ทจส-ท.

22 ต.ค. 2561

MEDIUM COST FOR BID NO. TILS-S-01
SUMMARY OF BID PRICE
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS) AND EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Schedule	Description	Currency	Supply of Equipment		Local Currency (excluding VAT) Baht Amount	Local Transportation (excluding VAT) Baht Amount	Local Transportation, Construction and Installation (excluding VAT) Baht Amount
			Foreign Supply	Local Supply			
			CIF Thai Port	Ex-works Price (excluding VAT) Baht			
			Amount	Amount			
1	500 KV THUNG SONG SUBSTATION (GIS)	THB	306,115,681.55	109,453,104.21	351,086,050.27	593,042.38	55,940,855.35
2	230 KV THUNG SONG SUBSTATION	THB	29,243,362.70	23,713,032.24	4,573,523.00	83,850.96	10,307,799.41
	BID PRICE	THB	335,359,044.25	Baht 133,166,136.45	Baht 355,659,573.27	Baht 676,893.34	Baht 66,248,654.76
	OTHER EXPENSES	THB	6,707,180.89	XXXXX	XXXXX	XXXXX	XXXXX
	VAT		23,944,635.76	Baht 9,321,629.55	Baht 24,896,170.13	Baht 47,382.53	Baht 4,637,405.83
	SUMMARY OF BID PRICE	THB	366,010,860.90	Baht 142,487,766.00	Baht 380,555,743.40	Baht 724,275.87	Baht 70,886,060.59
	TOTAL MEDIUM COST	THB			960,664,706.76		
	TOTAL MEDIUM COST (ROUND)	THB			961,000,000.00		

Schedule 1 and 2 are related schedules referring to Article F-15. Liquidated Damages for Late Completion and Late Delivery, item a. For Complete Construction of Substation.
 In case Bidder proposes price discount without specifying whether or not it includes Value Added Tax (VAT), EGAT will consider it as the price discount excluding VAT.

MEDIUM COST FOR BID NO. TILS-S-01
SCHEDULE 1 : 500 KV THUNG SONG SUBSTATION (GIS)
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Currency (excluding VAT) Baht Amount	Local Transportation (excluding VAT) Baht Amount	Local Transportation, Construction and Installation (excluding VAT) Baht Amount
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht			
		Amount	Amount			
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	297,022,314.85	106,685,390.21			55,940,855.35
PART 1C : CIVIL WORK				351,086,050.27		
PART 1D : SUPPLY OF SPARE PARTS	THB	9,093,366.70	2,767,714.00		593,042.38	
TOTAL PRICE	THB	306,115,681.55	Baht 109,453,104.21	Baht 351,086,050.27	Baht 593,042.38	Baht 55,940,855.35

วิมลภา ชีวธนากรดีกุล

หงส์-ท.
22 ต.ค. 2561

- Project 1-1C1 -

(นางสาวพนา สุภารักษ์)
อ.ส. 27ก.ย.61

filename : TILS-S-01-1 (500 KV)

MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB2 : Distribution Transformer	THB		1,720,000.00	172,000.00
Schedule 1AB4 : Surge Arrester	THB	2,796,000.00	576,000.00	337,200.00
Schedule 1AB5 : Current Transformer and Junction Box	THB		732,000.00	73,200.00
Schedule 1AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	3,710,000.00	1,174,000.00	488,400.00

Da
 วัลลภา ชีวชนากรณ์กุล

Fev.24

หงส-ห.
 22 ต.ค. 2561

- Project 1-1C2 -

Da 27.๑.๖1
 (นางสาวพวิศ สุภาวกุล) filename : TILS-S-01-1 (500 KV)
 กวส.

MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB7 : SF6 Gas Insulated Switchgear	THB	263,575,323.00		26,357,532.30
Schedule 1AB9 : Power Circuit Breaker	THB	12,366,880.80		1,236,688.08
Schedule 1AB10 : Disconnecting Switch	THB	3,249,400.00	699,600.00	394,900.00
Schedule 1AB11 : Power Fuse, Fuse Link and Hook Stick	THB	494,525.90		49,452.59

On
 วัลลภา ชีวธนากรณ์กุล


MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB12 : AC&DC Distribution Board and Termination Box			2,766,196.00	276,619.60
Schedule 1AB13 : Stationary Battery and Battery Charger	THB	3,501,979.12	1,871,100.00	537,307.91
Schedule 1AB14 : Substation Steel Structure			15,109,386.73	3,777,346.68
Schedule 1AB15 : Insulator				168,391.30

MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB16 : Cable Terminations	THB	321,765.40		80,441.35
Schedule 1AB17 : XLPE Power Cable			456,390.00	114,097.50
Schedule 1AB18 : Low Voltage Cable and Conductor			48,671,901.74	12,167,975.44
Schedule 1AB19 : Switchyard Lighting Fixtures			2,527,903.40	631,975.85


 วัลลภา ชีวชนากรณ์กุล
 หจส-ท.
 22 ต.ค. 2561


 (นางสาวพนา สุภาวกุล)
 อ.ส.

MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB20 : Aluminum Tube, Connector and Miscellaneous Hardware	THB	872,110.80	197,081.50	267,298.08
Schedule 1AB21 : Bus Fitting	THB	2,260,934.37		565,233.59
Schedule 1AB22 : Grounding Material	THB	2,739,676.06	1,578,647.84	1,079,580.98
Schedule 1AB23 : Substation Miscellaneous	THB	237,659.40	548,757.00	196,604.10

On
วัลลภา ชีวนากรกุล
หงส์-ห.
22 ต.ค. 2561

MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY


Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB24 : Control and Protection System			23,796,753.00	2,379,654.00
Schedule 1AB25 : Fault Recording System			3,498,206.00	349,820.00
Schedule 1AB34 : 48 VDC Stationary Battery, Battery Charger and DC Power Panel	THB	896,060.00		75,000.00
Schedule 1AB35 : Communication Cable			598,247.00	531,000.00

MEDIUM COST FOR BID NO. TILS-S-01
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB38 : Remote Terminal Unit			163,220.00	765,136.00
Schedule 1AB39 : Commissioning				2,868,000.00
PART 1AB	THB	297,022,314.85	Baht 106,685,390.21	Baht 55,940,855.35

MEDIUM COST FOR BID NO. TILS-S-01
PART 1C : CIVIL WORK
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Local Currency (excluding VAT) Baht
	Amount
Schedule 1C1 : Foundation Work	28,979,861.83
Schedule 1C2 : Cable Trench	15,728,817.00
Schedule 1C3 : Control Building	215,858,810.97
Schedule 1C4 : Earth Work, Road and Crushed Rock Surfacing	15,771,146.00
Schedule 1C5 : Water Supply System	138,364.00
Schedule 1C6 : Drainage System	27,107,877.15
Schedule 1C7 : Special Construction Works	4,975,818.92
Schedule 1C8 : Miscellaneous	5,400,653.00
Schedule 1C9 : Fire Protection System	37,124,701.40
PART 1C	Baht 351,086,050.27


 วัลลภา ชีวชนากรณ์กุล
 หจส-ท.
 22 ต.ค. 2561

MEDIUM COST FOR BID NO. TILS-S-01
PART 1D : SUPPLY OF SPARE PARTS
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1D7 : Spare Parts for SF6 Gas Insulated Switchgear	THB	- 7,956,245.00		397,812.25
Schedule 1D9 : Spare Parts for Power Circuit Breaker	THB	1,082,242.70		54,112.15
Schedule 1D11 : Spare Parts for Power Fuse, Fuse Link and Hook Stick	THB	54,879.00		2,743.98
Schedule 1D24 : Spare Parts for Control and Protection System			2,292,177.00	114,602.00



วิไลลา ชีวชนากรณ์กุล

ทจส-ท.

22 ต.ค. 2561

MEDIUM COST FOR BID NO. TILS-S-01
PART 1D : SUPPLY OF SPARE PARTS
SUPPLY AND CONSTRUCTION OF 500 KV THUNG SONG SUBSTATION (GIS)
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	(excluding VAT) Baht
		Amount	Amount	Amount
Schedule 1D25 : Spare Parts for Fault Recording System			475,537.00	23,772.00
PART 1D	THB	9,093,366.70	Baht 2,767,714.00	Baht 593,042.38



อดภา ชีวชนากรณ์กุล

ทจส-ท.

MEDIUM COST FOR BID NO. TILS-S-01
SCHEDULE 2 : 230 KV THUNG SONG SUBSTATION
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Currency (excluding VAT) Baht Amount	Local Transportation (excluding VAT) Baht Amount	Local Transportation, Construction and Installation (excluding VAT) Baht Amount
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht			
		Amount	Amount			
PART 2A B : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT	THB	28,199,324.10	23,080,023.24			10,307,799.41
PART 2C : CIVIL WORK				4,573,523.00		
PART 2D : SUPPLY OF SPARE PARTS	THB	1,044,038.60	633,009.00		83,850.96	
TOTAL PRICE	THB	29,243,362.70	Baht 23,713,032.24	Baht 4,573,523.00	Baht 83,850.96	Baht 10,307,799.41

MEDIUM COST FOR BID NO. TILS-S-01
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

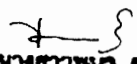
Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 2AB5 : Current Transformer and Junction Box	THB	5,688,900.00	843,500.00	783,888.00
Schedule 2AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	1,366,000.00	218,000.00	190,080.00
Schedule 2AB9 : Power Circuit Breaker	THB	13,913,944.00		1,669,673.28
Schedule 2AB10 : Disconnecting Switch	THB	5,969,700.00	1,732,104.00	924,216.48

MEDIUM COST FOR BID NO. TILS-S-01
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 2AB12 : AC&DC Distribution Board and Termination Box			137,514.00	16,501.68
Schedule 2AB14 : Substation Steel Structure			1,204,734.08	361,420.22
Schedule 2AB15 : Insulator				111,674.64
Schedule 2AB18 : Low Voltage Cable and Conductor			8,258,215.68	2,064,553.92


 วัลลภา ชีวชนากรณ์กุล
 หจส.ท.
 22 ต.ค. 2561

- Project 1-1C3 -

 27 ก.พ. 61
 (นายสุภาวดี สุภาวดี) filename : TILS-S-01-2 (230 KV)
 อวส.

MEDIUM COST FOR BID NO. TILS-S-01
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 2AB19 : Switchyard Lighting Fixtures			92,452.80	27,735.84
Schedule 2AB20 : Aluminum Tube, Connector and Miscellaneous Hardware			889,332.84	222,333.21
Schedule 2AB21 : Bus Fitting	THB	817,645.54		204,411.39
Schedule 2AB22 : Grounding Material	THB	257,415.84	544,625.40	200,510.31

MEDIUM COST FOR BID NO. TILS-S-01
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	Amount
		Amount	Amount	
Schedule 2AB23 : Substation Miscellaneous	THB	185,718.72	565,246.44	187,741.29
Schedule 2AB24 : Control and Protection System			8,540,378.00	992,318.00
Schedule 2AB25 : Fault Recording System				74,742.55
Schedule 2AB38 : Remote Terminal Unit			53,920.00	145,998.60

On

วิมลภา ชีวธนากรกุล

หจส-ห.

22 ต.ค. 2561

- Project 1-1C5 -

27.10.61
 (นางสาววิมลภา ชีวธนากรกุล) filename : TILS-S-01-2 (230 KV)

MEDIUM COST FOR BID NO. TILS-S-01
PART 2AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 2AB39 : Commissioning				1,394,000.00
Schedule 2AB40 : Installation of Equipment and Steel Structure Supplied by EGAT				736,000.00
PART 2AB	THB	28,199,324.10	Baht	Baht 10,307,799.41



 วัลลภา ชิวชนากรณ์กุล

ทงส.-ท.

22 ต.ค. 2561

MEDIUM COST FOR BID NO. TILS-S-01
PART 2C : CIVIL WORK
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Local Currency (excluding VAT) Baht
	Amount
Schedule 2C1 : Foundation Work	2,040,840.00
Schedule 2C2 : Cable Trench	1,842,615.00
Schedule 2C4 : Earth Work, Road and Crushed Rock Surfacing	25,792.00
Schedule 2C6 : Drainage System	303,376.00
Schedule 2C8 : Miscellaneous	135,400.00
Schedule 2C9 : Fire Protection System	225,500.00
PART 2C	Baht 4,573,523.00


 วัลลภ ขีวชนากรณ์กุล
 ทจส-ท.
 22 ต.ค. 2561

MEDIUM COST FOR BID NO. TILS-S-01
PART 2D : SUPPLY OF SPARE PARTS
SUPPLY AND CONSTRUCTION FOR EXPANSION OF 230 KV THUNG SONG SUBSTATION
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Description	Currency	Supply of Equipment		Local Transportation (excluding VAT) Baht Amount
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 2D9 : Spare Parts for Power Circuit Breaker	THB	1,044,038.60		52,201.96
Schedule 2D24 : Spare Parts for Control and Protection System			633,009.00	31,649.00
PART 2D	THB	1,044,038.60	Baht 633,009.00	Baht 83,850.96


 อดิภา ชีวมากรณ์กุล

ทงส-ท.
 22 ต.ค. 2561

DATA SHEET

for

Invitation to Bid No. TILS-S-01

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:

“1. Being a juristic person who signs Integrity Pact Agreement for Cooperation to Prevent and Abstain from Corruption on Procurement of Electricity Generating Authority of Thailand to be submitted on the bid opening date.”

Article B-3. Bid Security

The amount of bid security shall be USD 1,473,350.- or THB 48,050,000.-.

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:

t. Integrity Pact Agreement for Cooperation to Prevent and Abstain from Corruption on Procurement of Electricity Generating Authority of Thailand signed by the Bidder (if required).

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 : 500 kV Thung Song (GIS) or Schedule 2 : 230 kV Thung Song, 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 : 500 kV Thung Song (GIS) and Schedule 2 : 230 kV Thung Song for each Day of delay. This sum is payable regardless of the actual loss and/or damages incurred. In no event shall the aggregate amount of liquidated damages exceed ten (10) per cent of the total Contract Price of those schedules.

Maintenance Guarantee Period

- For all Work except 500 kV System

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

<u>Equipment</u>	<u>Period of Guarantee (Year)</u>
- Fault Recording System	2
- Control and Protection System	2

- For 500 kV System

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

Defective Equipment to be replaced with the whole new set

Not Applicable

INVITATION TO BID NO. TILS-S-01

SUPPLY AND CONSTRUCTION OF 500 kV THUNG SONG SUBSTATION (GIS) AND EXPANSION OF 230 kV THUNG SONG SUBSTATION

TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Invitation

The Electricity Generating Authority of Thailand (EGAT) hereby invites sealed bids for supply and construction of 500 kV Thung Song Substation (GIS) and Expansion of 230 kV Thung Song Substation under Transmission System Improvement Project in Lower Southern Region to Enhance System Security as described herein in accordance with terms, conditions and Specifications described in these Bidding Documents.

Work Description

The supply and construction of 500 kV Thung Song Substation (GIS) and Expansion of 230 kV Thung Song 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.

Eligibility of Bidders: General Requirements

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

- a. The Bidder shall be a partnership, firm or company, either alone or in joint venture or in consortium.
- b. The Bidder shall be well-established and maintain a permanent place of business.
- c. The Bidder shall not be, or supply the Equipment, from the country under the state of Civil War.
- d. The Bidder shall be a juristic person who manufactures or provides such material or services, as the case may be, and not be named in the List of Work Abandoners published by the Office of Prime Minister and/or in the Debarment List and/or in the List of Work Abandoners declared by EGAT.

- e. The Bidder shall be a juristic person who neither fails to submit the Revenue and Expense Accounts nor fails to present proper and complete accounts to the Revenue Department of Thailand, in accordance with the Notification of the National Anti-Corruption Commission Concerning Principles and Methods of Preparing Revenue and Expense Accounts of Project between Individual/Company and Government Agencies B.E. 2554 (A.D. 2011) as amended from time to time (“the Notification”).
- f. The Bidder shall be a juristic person who registers for e-Government Procurement (e-GP) at Thai Government Procurement website (www.gprocurement.go.th at telephone No. 662 1277386 – 89) of the Comptroller General’s Department of Thailand.

Due to the fact that the e-GP system is not ready for registration for foreign Bidders who have no taxpayer identification number at this moment, foreign Bidders are, therefore, temporarily released from this qualification. However, whenever the e-GP system is ready, all foreign Bidders shall register in the e-GP system.

- g. 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.
- h. 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.
- i. 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.
- j. 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.
- k. The Bidder shall have purchased the Bidding Documents from EGAT as described under Article A-7. Availability of Bidding Documents. For a joint venture or consortium, only one member of the joint venture or consortium is required to purchase the Bidding Documents.

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

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

Eligibility of Bidders: Technical Requirements

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

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

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

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

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

- b. The Bidder shall 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 500 kV or above conventional or GIS substation, with its overall performance satisfactory to EGAT;
 - 2) Having experience in executing at least three (3) contracts as contractor (not as subcontractor) for supply and construction of 420 kV or above maximum system voltage conventional or GIS substation, with at least three (3) consecutive years of operation. At least one of these three contracts shall be executed and performed in an overseas country (not his own country);
 - 3) For local firm, Having experience with EGAT in executing at least five (5) contracts as contractor (not as subcontractor) for supply and construction of 220 kV or above conventional or GIS substation with at least three (3) consecutive years of operation, with its overall performance satisfactory to EGAT. At least three of these five contracts shall be complete substation;

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) and 2) mentioned above, having an excellent reputation and adequate technical knowledge and practical experience on design, construction, installation and commissioning of at least three (3) 420 kV or above maximum system voltage conventional or GIS substation, with at least three (3) consecutive years of operation. At least one of these three contracts shall be in an overseas country (not his own country). Bidder shall also demonstrate his capacity to perform Work.

Further to b.3) mentioned above, having an excellent reputation and adequate technical knowledge and practical experience on design, construction, installation and commission of at least three (3) 220 kV or above EGAT's conventional or GIS substations with at least three (3) consecutive years of operation. Bidder shall also demonstrate his capacity to perform the 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 equipment manufactured by the qualified manufacturers who shall fulfill the following requirements:
1. Regularly manufacturing of Equipment of the type and similar ratings proposed.
 2. Being well-established and maintaining a permanent place of business.
 3. The manufacturer shall have the experience records that meet the requirements set forth herein.

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

4. If the Manufacturer is a new company formed by acquisition of or merger with other companies or business units, and any of such previous companies or business units has the experience records that meet the requirements set forth herein, such experience records are acceptable as the experience records of the new company, provided that each item of the equipment to be supplied under this bid shall be manufactured from the same source of supply as indicated in each of such relevant supply records as described in Item I.d.5 to I.d.8. Otherwise, it shall not be acceptable and shall be sufficient grounds for rejection.

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

5. For 500 kV Ratings of Gas-Insulated Switchgear (GIS) or Gas-Insulated Bus (GIB). These Equipment 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 Having supply record of Equipment of the type proposed (*type of enclosure, interrupter of circuit breaker, rated filling gas pressure*) at the maximum system voltage of 420 kV or above, 3000 A or above, 50 kA or above, with successful operation/use of at least five (5) consecutive years in overseas country (not his own country) and at least three (3) substations of which total GIS bays shall not be less than twelve (12).

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

- 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 500 kV Control and Protection System, having the following qualifications:
- 6.1 Being local manufacturer.
- 6.2 Having one of the following qualifications:
- 6.2.1 Having at least three (3) consecutive years' supply record of successful operation/use in 500 kV Transmission System of at least three (3) units of each type of Protective Relay Panels of which the characteristics are similar to the ones specifies herein to EGAT.
- OR
- 6.2.2 Having a letter of acceptance for manufacturing and/or fabrication of the specific Equipment issued by EGAT within the scope specified therein.
7. For 230/115 kV Ratings of Gas-Insulated Switchgear (GIS). These Equipment shall be manufactured by the qualified manufacturers who shall fulfill the following requirements :

7.1 Having one of the following qualifications:

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

OR

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

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

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

In case that the supply record of Equipment of the type and ratings proposed fulfills the requirement, the manufacturer may propose a newly developed or modified type of such

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

For 115 kV Gas-Insulated Switchgear (GIS):

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

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

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

7.2 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.

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

8.1 Being local manufacturer.

8.2 Having one of the following qualifications :

8.2.1 Having at least three (3) consecutive years' supply record of successful operation/use in 220 kV or above Transmission System of at least three (3) units of each type of Protective

Relay Panels of which the characteristics are similar to the ones specified herein to EGAT or other Electricity Authorities of Thailand

OR

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

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

- a. The Bidder shall have sufficient capacity to carry out the work.
- b. The Bidder shall have no just or proper claims pending against him with respect to breach in the performance of Contract on other similar works awarded by EGAT. In case the Bidder is a joint venture/consortium, either member of the joint venture/consortium shall have no just or proper claims pending against him with respect to breach in the performance of Contract on other similar works awarded by EGAT.
- c. The Bidder himself or his subcontractors, at the time of submitting this proposal, shall not carry excessive work nor be in a default position with respect to work with EGAT. Unsatisfactory past performance on Contract awarded by EGAT may be a sufficient reason of being disqualified.
- d. The Bidder shall propose Equipment from manufacturers who fulfill the requirements below. If there is any deficiency, EGAT reserves the right to require the Bidder to propose new manufacturer or new type/model of Equipment without any additional cost to EGAT.
 1. Regularly manufacturing of Equipment of the type and similar ratings proposed.
 2. Being well-established and maintaining a permanent place of business
 3. The manufacturer shall have the experience records that meet the requirements set forth herein.

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

4. If the Manufacturer is a new company formed by acquisition of or merger with other companies or business units, and any of such previous companies or business units has the experience records that meet the requirements set forth herein, such experience records are acceptable as the experience records of the new company, provided that each item of the equipment to be supplied under this bid shall be manufactured from the same source of supply as indicated in each of such relevant supply records as described in Item II.d.5 thru II.d.17 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 500 kV Ratings of following Equipment : Power Circuit Breaker, Instrument Transformer, Surge Arrester and Disconnecting Switch. These Equipment 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 Having a supply record of Equipment at the maximum system voltage of 420 kV or above, 3000 A or above, 50 kA or above, with successful operation/use of at least five (5) three-phase sets and for minimum five (5) 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 five (5) three-phase sets and of 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.

- 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 Power Circuit Breaker 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 For 230 kV Power Circuit Breaker:

Having a supply record of Equipment of the type proposed at nominal system voltage of 220 kV or above, 3000 A or above, 50 kA or above, with successful operation/use of at

least three (3) consecutive years in an overseas country (not his own country) and at least three (3) three phase sets.

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

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

For 115 kV Power Circuit Breaker:

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

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

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

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

7.1 Having one of the following qualifications:

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

OR

- 7.1.2 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.

- 7.2 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.

8. For 33, 22 and 11 kV ratings of following equipment : Power Circuit Breaker, Instrument Transformer, Disconnecting Switch and Surge Arrester

Having one of the following qualifications :

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

OR

- 8.2 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. EGAT, however, reserves the right and will make its own judgment whether or not to consider / 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.

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

9.1 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, 230 kV and below Compression Connector and Miscellaneous Hardware, Thermite Welding Material and Conduit.

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

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

9.3 Having one of the following qualifications :

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

OR

9.3.2 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).

10. For Insulator

Having one of the following qualifications :

10.1 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 :

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

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

OR

10.2 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 Stationary Battery

Having one of the following qualifications :

11.1 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

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 above 33kV through 500 kV Outdoor Type Cable Termination and Cable Termination for GIS.

Having one of the following qualifications :

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

OR

- 12.2 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.

13. For 230 kV XLPE Power Cable

Having one of the following qualifications :

- 13.1 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

- 13.2 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).

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

15. For Fault Recording System.

15.1 Having one of the following qualifications:

- 15.1.1 The cabinet and all equipment is completely wired by the manufacturer before shipping to Thailand.

OR

15.1.2 The cabinet and the equipment are wired in Thailand by the manufacturer that has obtained special permission from EGAT for manufacturing and /or fabrication of the Control and Protection System within the scope specified in the Letter of Permission which is issued by EGAT (for the local manufacturer). The design and engineering shall be performed by the FRS's manufacturer. The assembly, factory test and commissioning shall be in accordance with the FRS's manufacturer standard and performed under the manufacturer's supervisor.

15.2 The Fault Recording System (FRS) proposed shall be in compliance with the details specified in EGAT's Specifications. Manufacturer/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

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

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

17.1 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.

17.2 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.

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

17.3.1 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

17.3.2 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.

17.4 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.

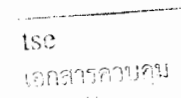
In case the manufacturer is a new company formed by acquisition or merger with other companies or business units, the pending claim of any of such previous companies or business units shall be considered pending claim of the manufacturer.

- 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.

EGAT ACCEPTED MAIN RELAY LIST No.1

Scheme	Technique	Accepted Type/Model	Manufacturer	Acceptance for			Notes
				500kV	230kV	115&69kV	
Current Differential	Numerical	RED670	ABB	YES	YES	YES	Only software version 1.1 is accepted.
		P543	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
		L90	GE	YES	YES	YES	
		SEL-311L	SEL	YES	YES	YES	
		7SD52	Siemens	YES	YES	YES	
		GRL100	Toshiba	YES	YES	YES	
		P543	Schneider Electric	YES	YES	YES	
		EF-LD	INGETEAM	YES	YES	YES	
		PCS-931	NR Electric	YES	YES	YES	
Distance Protection	Numerical	REL670	ABB	YES	YES	YES	Only software version 1.1 is accepted.
		P443	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
		D30	GE		YES	YES	Only for three pole tripping and line protection that no need carrier scheme.
		D60	GE		YES	YES	
		ALPSDA1	GE	YES	YES	YES	
		SEL-311C	SEL			YES	Only for three pole tripping and line protection that no need carrier scheme.
		SEL-421	SEL	YES	YES	YES	For 21P, 85, 67N. The relay with auto-reclosing function can not be accepted.
		7SA522	Siemens	YES	YES	YES	
		7SA6 series	Siemens	YES	YES	YES	
		GRZ100	Toshiba		YES	YES	
		GRZ200	Toshiba		YES	YES	
		ZLV	ZIV		YES	YES	
		P443	Schneider Electric	YES	YES	YES	
		EF-ZT	INGETEAM	YES	YES	YES	
		PCS-902	NR Electric	YES	YES	YES	
Transformer Differential	Numerical	RET670	ABB	YES	YES	YES	Only software version 1.1 is accepted.
		RET650	ABB	YES	YES	YES	3-restraints.
		P64x	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"

N.R.



EGAT ACCEPTED MAIN RELAY LIST No.1

Scheme	Technique	Accepted Type/Model	Manufacturer	Acceptance for			Notes
				500kV	230kV	115&69kV	
Transformer Differential	Numerical	T35	GE		YES	YES	
		T60	GE		YES	YES	
		Duobias	Siemens		YES	YES	The manufacturer's name "Reyrolle" is changed to "Siemens"
		SEL-387	SEL		YES	YES	4-restraints.
		SEL-487E	SEL	YES	YES	YES	
		SEL-587	SEL			YES	2-restraints.
		SEL-787	SEL			YES	2-restraints.
		7UT6	Siemens	YES	YES	YES	5-restraints.
		GRT100	Toshiba	YES	YES	YES	
		GRT200	Toshiba	YES	YES	YES	
		IDV	ZIV	YES	YES	YES	
		P645	Schneider Electric	YES	YES	YES	
		EF-TD	INGETEAM	YES	YES	YES	3-restraints.
		PCS-978	NR Electric	YES	YES	YES	
Busbar Protection	High Impedance	REB650	ABB	YES	YES	YES	
		SEL-587Z	SEL	YES	YES	YES	
		GRB150	Toshiba	YES	YES	YES	
Busbar Protection	Numerical Low Impedance	REB670	ABB	YES	YES	YES	Only software version 1.1 is accepted.
		REB500	ABB	YES	YES	YES	
		P746	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
		P740	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
		B90	GE	YES	YES	YES	
		B30	GE	YES	YES	YES	Only use in case that the bus arrangement is Breaker-and-a half, Double-bus-Double-Breaker or Main-and-Transfer.
		P747	GE	YES	YES	YES	
		SEL-487B	SEL	YES	YES	YES	
		7SS52	Siemens	YES	YES	YES	
7SS60	Siemens	YES	YES	YES	Only use in case that the bus arrangement is Breaker-and-a half, Double-bus-Double-Breaker or Main-and-Transfer.		

N.V

EGAT ACCEPTED MAIN RELAY LIST No.1

Scheme	Technique	Accepted Type/Model	Manufacturer	Acceptance for			Notes
				500kV	230kV	115&69kV	
Busbar Protection	Numerical Low Impedance	7SS85	Siemens	YES	YES	YES	
		GRB100	Toshiba	YES	YES	YES	
		P746	Schneider Electric	YES	YES	YES	
		P740	Schneider Electric	YES	YES	YES	
Breaker Failure Protection	Numerical	RAHB411	ABB	YES	YES	YES	
		REQ650	ABB			YES	
		P141	GE	YES	YES	YES	3-phase Breaker failure function only. The manufacturer's name "ALSTOM" is changed to "GE"
		P14Nx	GE	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
		C60	GE		YES	YES	
		F60	GE		YES	YES	
		SEL-501	SEL	YES	YES	YES	3-phase Breaker failure function only.
		P821	Schneider Electric		YES	YES	Only firmware version 1.F is accepted.
		7VK6 series	Siemens	YES	YES	YES	The function and the operating time for each system shall be conform to Specification nos. 1005 and 1002.
		GRC100	Toshiba		YES	YES	
		GRD200	Toshiba	YES	YES	YES	
		EF-ZT	INGETEAM	YES	YES	YES	
		PCS-9611	NR Electric	YES	YES	YES	3-phase Breaker failure function only.

Note

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

47

2.11

EGAT ACCEPTED MAIN RELAY LIST No.2

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

EGAT ACCEPTED MAIN RELAY LIST No.2

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

๒๗

๗.๕

EGAT ACCEPTED MAIN RELAY LIST No.2

Scheme	Technique	Accepted Type/Model	Manufacturer	Acceptance for				Notes
				500kV	230kV	69&115kV	22&33kV	
Synchronism Check Relay	Numerical	EF-MD	INGETEAM	YES	YES	YES		
		PCS-9611	NR Electric	YES	YES	YES		
	Static	RASC	ABB	YES	YES	YES		only use in Interposing Panel.
Auto Reclosing Relay	Numerical	REQ650	ABB	YES	YES	YES		
		P841	GE	YES	YES	YES		The manufacturer's name "ALSTOM" is changed to "GE"
		F60	GE		YES	YES		3 pole reclose only
		F650	GE		YES	YES		3 pole reclose only
		DRS	GE		YES	YES		3 pole reclose only
		SEL-279H	SEL		YES	YES		3 pole reclose only
		SEL-351A	SEL		YES	YES		3 pole reclose only
		SEL-451	SEL		YES	YES		3 pole reclose only
		SEL-751	SEL		YES	YES		3 pole reclose only
		7VK512	Siemens	YES	YES	YES		
		7VK61	Siemens	YES	YES	YES		
		GRR100	Toshiba	YES	YES	YES		
		GRD200	Toshiba	YES	YES	YES		
		EF-ZT	INGETEAM	YES	YES	YES		
		PCS-9611	NR Electric		YES	YES		3 pole reclose only
Overfluxing Relay	Static	RALK	ABB	YES	YES	YES		
	Numerical	7RW600	Siemens	YES	YES	YES		
		EF-TD	INGETEAM	YES	YES	YES		
Frequency Relay	Numerical	P94Vx	GE	YES	YES	YES	YES	The manufacturer's name "ALSTOM" is changed to "GE"
		MIV	GE		YES	YES	YES	
		SEL-351A	SEL	YES	YES	YES	YES	
		SEL-451	SEL	YES	YES	YES	YES	
		SEL-751	SEL	YES	YES	YES	YES	

EGAT ACCEPTED MAIN RELAY LIST No.2

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

Note

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

ise
เอกสารควบคุม

EGAT ACCEPTED FAULT RECORDING SYSTEM LIST

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

Note

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

M. U.

EGAT ACCEPTED MANUFACTURER LIST FOR PROTECTIVE RELAY

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

~.U

tse
เอกสารควบคุม

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

Handwritten initials: J.U.

SCOPE OF WORK

H-1. General

<u>No.</u>	<u>Substation</u>	<u>Page</u>
1.	THUNG SONG SUBSTATION (TS) (Job No. TILS-01-S02)	H2

1. **THUNG SONG Substation (GIS) (Job No. TILS-01-S02)**

General

The new 500kV GIS and 230kV Conventional Thung Song Substation is located at Tumbon Ti Wang, Amphur Thung Song, Nakhon Si Thammarat Province. The new 500kV GIS Thung Song Substation is Breaker & A Half Scheme shall be installed inside the new separately GIS building.

The Scope of work comprises two schedules as follows:

Schedule 1

The new 500kV GIS shall have three diameters with Breaker & A Half scheme to be provided for transmission line and autotransformer as follows:

- Two (2) Feeders for 500 kV Lines No. 1 & 2 to **Surat Thani 2 Substation**.
- Two (2) Feeders for 500 kV Lines No. 1 & 2 to **Hat Yai 3 Substation (Future)**.
- Two (2) Feeders for 3-1 x 333.33 MVA, 500/230-22 kV auto-transformer “**KT6A, KT7A**”

Schedule 2

The existing 230 kV Conventional shall be extended and improved for the following:

- Improve bay 5-6 for 3-1 x 333.33 MVA, 500/230-22 kV auto-transformer “**KT6A**”
- Improve bay 6-6A for 230 kV Lines No.1 to **Krabi Substation**.
- Improve bay 7-8 for 230 kV Lines No.2 to **Krabi Substation**.
- Add a new bay 8-8A for 3-1 x 333.33 MVA, 500/230-22 kV auto-transformer “**KT7A**”

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

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

- 1) As stated elsewhere in this bidding documents, the drawings included in the bidding documents except drawing mark "For Construction" are for bidding purposes only and shall not be used for execution of the work.
- 2) The submitted drawings which are incomplete/unacceptable, or are the bidding document copies with minor modifications shall be returned unmarked to the Contractor.
- 3) The drawings shall be furnished which provide all details required for thoroughly described equipment as well as installation methods and requirements. However, EGAT retains the right to request additional details if those furnished are perceived inadequate.
- 4) Calculations, backup data and documentation are required for all parts of the design. The furnished data shall verify completely that design is adequate for application purpose.

Work included in this Contract.

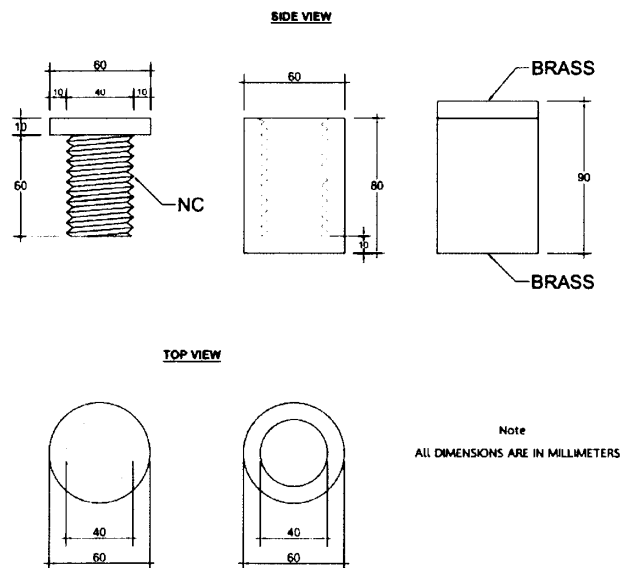
The Work included in this Contract to be performed by the Contractor shall be as specified in the Contract Documents and as follows:

For Electrical work

GIS and Conventional Substation

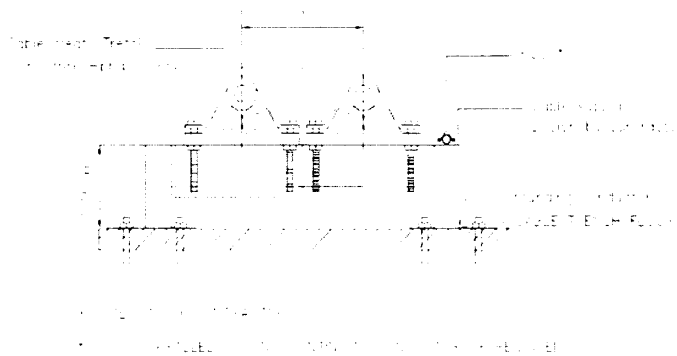
1. Design, supply and installation of equipment required for a complete the new 500 kV GIS Substation.
2. Design, supply and installation of equipment required for a complete 230 kV Conventional Substation as follow:
 - Bay 5-6 : for 3-1 x 333.33 MVA, 500/230-22 kV auto-transformer “**KT6A**”
 - Bay 6-6A : for 230 kV Lines No.1 to **Krabi Substation.**
 - Bay 7-8 : for 230 kV Lines No.2 to **Krabi Substation.**
 - Bay 8-8A : for 3-1 x 333.33 MVA, 500/230-22 kV auto-transformer “**KT7A**”
3. Design, supply and installation of miscellaneous hardware required for the following:
 - 3.1 The connection between the 500 kV & 230 kV Substation.
 - 3.2 The connection of 500 kV GIS air bushings and 230 kV Conventional to the 3-1x333.33 MVA, 500/230-22 kV auto-transformers.
 - 3.3 The connection of 500kV GIS air bushings and 230 kV Conventional to 500 kV & 230 kV overhead lines.

- 3.4 The connection of 500 kV overhead lines to the 55 MVar, 525 kV Shunt Reactor.
 - 3.5 The grounding equipment and miscellaneous hardware for the 525 kV Shunt Reactors and their Neutral Reactors.
 - 3.6 The grounding equipment and miscellaneous hardware for the 3-1x333.33 MVA, 500/230-22 kV auto-transformers (KT6A, KT7A).
4. Supply and installation of the marking pins for the referenced positions from the main bus shall be provided in the GIS building. The positions of the marking pins shall be shown on the drawings for future GIS extension and the quantity shall be not less than 3 sets. The making pins shall be made of brass or stainless steel that have the formation as follows:



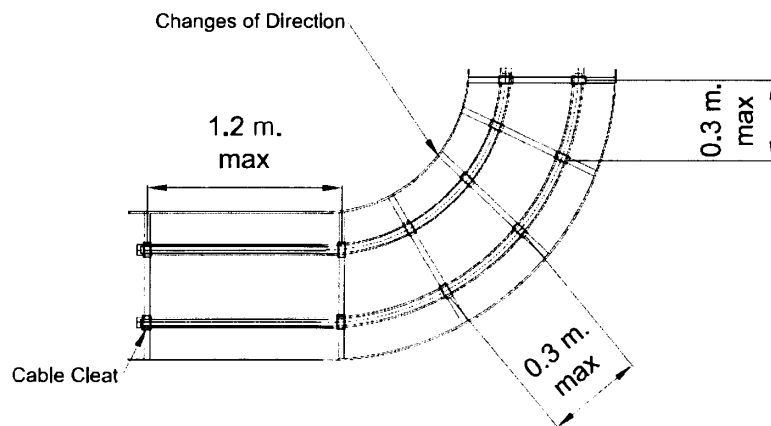
5. The GIB shall not be installed in multiple stacks for the purpose of convenient maintenance.
6. The detachable walk way (Cat walk) for visual inspection shall be properly installed on each GIS module and removable Service Platform, Removable Ladder shall be provided for GIS inspection.
7. Design, supply and installation of the equipment required for connecting the 22 kV tertiary of the 3-1x333.33 MVA, 500/230-22 kV auto-transformer to be delta form.
8. The sag and tension of phase wires and overhead ground wires shall be calculated and designed according to internationally-accepted standards by the Contractor and the said calculation shall be submitted to EGAT for approval.
9. Design, supply and installation of 22 kV XLPE cable system which comprises at least the following:

- 9.1 The design and calculation of the 22 kV cable system shall conform to IEC or IEEE standards.
- 9.2 The 22 kV XLPE cable shall be single-core with copper conductor.
- 9.3 Design, supply and installation of the 22 kV XLPE cables in a 22 kV system complete from one end at the 22 kV bus to the Station service transformers KW6A and KW7A, including cable trench, cable supporting structures, cable spacers, cable cleats, cable termination supporting structures, cable terminations, miscellaneous hardware, link box, SVL (if applicable) and all related equipment. The cable cleats shall be hot dip galvanized.
- 9.4 The 22 kV XLPE cable shall be installed in trefoil formation as follow:



- 9.5 The minimum bending radius of the 22 kV XLPE cable shall be checked by Contractor for cable installation and cable trench design.
- 9.6 The Contractor shall design the 22 kV cable system such that one (1) 1/C-35 Sq.mm XLPE cable shall be able to carry the continuous current no less than 50 A given that the ambient temperature is not less than 45°C and the effect of solar heat shall be considered. The other parameters used in the design shall be practical, reasonable, operational and conform to IEC or IEEE standards. The calculated continuous current rating shall be shown in the single-line diagram. The calculation shall be submitted to EGAT for approval.
- 9.7 The Contractor shall design and select the type of metallic screen bonding. The induced voltage measured in every point of the metallic screen of 22 kV XLPE cables shall be less than 60 V or shall conform to the IEC or IEEE standards' calculation.
- 9.8 Design, supply and installation the equipment to protect the power cable from the surge voltage.
- 9.9 Cable Cleats: The cleats shall rigidly support and secure the cables when installed at intervals along the length of the cables. The surface of cleats shall be free from sharp edges, burrs, flash, etc. that are likely to damage cables or inflict injury to the installer or user. The cleats shall be made of aluminum or

stainless steel or composite materials according to **IEC61914**'s definition. For composite materials, the integral pad shall be low smoke, low fume and halogen free. One cleat shall be provided with the closure bolt and nut assembly, and the mounting bolt and nut assembly. The closure bolt and nut shall be made of stainless steel. The cleats shall be designed conform to **IEC61914** and able to resist the electromechanical force, withstanding more than one short circuit. The cleats shall be able to resist ultraviolet light (UV), very heavy impact and corrosion. The cable cleat shall have the operating temperature range from - 15°C to 105°C. For EPC project, the position and number of cable cleats shall be calculated and determined by Contractor to withstand the electromechanical force from short circuit according to IEC61914. However, the maximum span between cleats is 1.2 meters for a straight path and 0.3 meters at a bending point as follows:



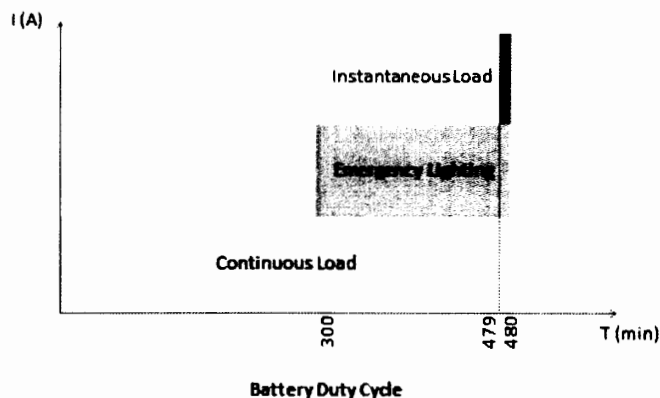
For 22 kV system the calculation of forces caused by short-circuit currents, the peak short circuit current shall be 62.5 kA, trefoil formation. The cable supporting structure shall be made of stainless steel, aluminum alloy or galvanized steel. The contractor shall design, supply and install the cable supporting structures that are suitable for cable cleat and cable system installation, and their grounding.

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

1. The type test report or the commission test report of each structural type for
 - 1.1 The test for resistance to electromechanical force withstanding more than one short circuit conform to IEC61914.
 - 1.2 The test for resistance to ultraviolet light conform to IEC61914.
2. The official letter from manufacturer or the official agent to confirm the intention to be the supplier and will supply the product according to the type test report or the commission test report.

Station service system

10. Design, supply and installation of station service system complete with integral accessories to provide a complete system operation. The station service system mainly consists of as follows:
 - 500 kVA, 22,000-400/230 V distribution transformers (KW6A).
 - 500 kVA, 22,000-400/230 V distribution transformers (KW7A).
 - Load Center Unit Substation (LCUS).
 - 22 kV drop-out fuses.
 - 600 V, 800 A safety switches.
 - 22 kV equipment, and AC&DC distribution boards, stationary batteries, battery chargers, power cables and all related equipment for the complete operation.
11. Design, supply and installation of equipment required for a complete 400/230 V. Power supply system.
12. 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 below 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 calculation shall be submitted to EGAT for approval. The size of battery shall not be less than as follows:
 - a) 1200 Ah for 500 kV Substation.
 - b) 600 Ah for 230 kV Substation.



13. Emergency lighting system shall be installed at the Control building and GIS building in case of normal station service fails. The said emergency lighting system is activated and capable of generating illumination level of at least 150 lux for at least 3 hours.

Grounding system

14. Design, supply and installation the grounding system of the 500 kV, 230 V Substation grounding system including the grounding system of 500 kV, 230 kV and 22 kV system.
15. The grounding conductor of the substation grounding system shall be of 4/0 AWG bare copper wire type.
16. The ground grid conductors spacing under the building area shall be the same as the Switchyard.
17. Design, supply and installation of the grounding equipment and miscellaneous hardware for 500/230 kV system including the 22 kV power supply system and 22 kV XLPE cable system.
18. The contractor shall evaluate the price of ground grid for the additional area based on the specified design for price reference as below:
 - 18.1 The maximum ground grid conductor spacing (D_0) shall be 5 meters.
 - 18.2 The number of ground rod shall be 200 pieces.
19. The Contractor shall conduct the soil resistivity measurement. The result shall be submitted to EGAT for approval.
20. The Contractor shall design a grounding grid based on the measured soil resistivity by hand calculation using the equations in IEEE-80 standard and submitted to EGAT for Approval. The parameters for grounding system calculation shall be used as follows;
 - The symmetrical fault current (rms) = 50 kA.
 - Time duration of fault = 1 sec.
 - The fault current division factor (S_f) = 1 shall be used for determining the RMS symmetrical grid current.

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

21. The Contractor shall connect the grounding grid between the additional area and the existing area.

Lightning protection system

22. 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:

- a) 1550 kV for 500 kV Substation.
- b) 900 kV for 230 kV Substation.

shall be used in calculation instead of Critical Flashover voltage (CFO).

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

23. For the design of lightning protection system for the Control Building and GIS building the lightning protection level (LPL) shall be used level 1 for calculation and the overhead ground wire is not permitted. Air terminal rods installed at the roof shall be used instead.
24. Lightning protection system shall be designed to meet IEC, NEMA and E.I.T. standards or internationally-accepted standards.

Facility system

25. Outdoor facility system

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

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

- 25.3 Design, supply and installation of circuits for remote control and door phone system of the main entrance gate. The control of the entrance gate shall be operated in both manual and remote-control modes which shall be controlled from either the control room or the guardhouse.

26. Indoor facility system

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

26.2 The lamps for indoor facility lighting system shall be LED type with all integral accessories, e.g. lamp holders, fixtures, reflectors, and etc. The Contractor shall provide drawings that show details for installation and specify the LED lamp and LED luminaire circuit identified that the LED lamp circuit shall be supplied by 2 - 3 manufacturers.

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

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

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

Telecommunication system

29. Design, supply and installation of the telecommunication tower and cable ladder for telecommunication system by modifying the TELECOMMUNICATION TOWER "WSA" TYPE as shown in Dwg. No. UWC-06-WSA-501, 502, 503 & 504. The said tower shall be constructed and divided into appropriate portions which are painted white and orange alternately with the top and bottom portions being painted orange. The obstruction lighting system shall be controlled by automatic flash box (AFB) that gives 30-60 flashes per minute. The AFB shall be turned on and turned off by a photo-light switch. The lightning protection for the telecommunication tower shall be calculated and designed by the contractor and the said calculation shall be submitted to EGAT for approval.

Grid Connected Rooftop Solar PV system

The Contractor shall design, supply and installation for the Grid Connected Rooftop Solar PV system at the top of buildings as follows:

Building	Rooftop area (sq. m)	PV Sizing (kW _{dc})
500 kV GIS building	2,500 (20 x 125)	≥200
Control Building	480 (16 x 30)	≥40
*The PV sizing (kW _{dc}) as shown in the above table is a minimum. In case of the length of GIS building extension, the PV sizing shall be in accordant with the Rooftop area.		

The Rooftop Solar PV system shall consist of following equipment/components but not limit to:

- Solar Photovoltaic (SPV) Module. (Crystalline silicon)
- PV Array.
- Module Mounting Structure & frames.
- Grid Tied Inverter with function of Maximum Power Point Tracking (MPPT).
- Energy meter.
- Online data logger and Remote Monitor Unit through LAN Base or GSM network.
- Weather Station (One set common for all system).
- Protection systems (Lightning, Surge, Earthing and Grid Islanding).
- AC Panel and DC Panel.
- Combiner and Junction boxes.
- Disconnection Device, Surge Protective Device (SPD).
- IR/UV protected PVC cables, pipes, wire way accessories.
- Any other item(s) as may be required to successfully commission and operate such rooftop system.

The components and parts used in the SPV system should conform to the IEC, E.I.T or internationally-accepted standards. The diagram and Technical Specifications of systems as shown in Dwg.No. SE-PV-0-01/02 & 02/02 to be used for guidance design and contractor is required to provide but not limit to:

- Submittals for Design concepts and engineering calculation documents that are signed by a licensed architect or engineer.
- Submittals for materials and products.
- Manuals (design calculations, operation/maintenance, shop drawing, etc.)
- Testing and Commissioning of the Rooftop Solar PV system.
- Performance Evaluation required to meet minimum guaranteed generation with performance Ratio (PR) at the time of Commissioning. The PR should be shown minimum of 75% at the time of inspection for initial commissioning

acceptance. The PR will be measured at Inverter output level during peak radiation conditions.

- Mentoring and training to EGAT's operating staff for operation and maintenance.

- Warranty Terms:

Insurance period for Workmanship and/or Materials during first two years and Insurance of Power Output of Rooftop Solar PV system as follows:

Period of Time	Minimum Power Output of Rooftop PV Module (%)
At delivery	Pmin*
0 - 10 Year	90% of Pmin*
11 - 20 Year	80% of Pmin*
Pmin* : Minimum peak power output (95% of nominal peak power output)	

If the equipment/components of Rooftop Solar PV system fail to exhibit such power output in prescribed time span, the Contractor will bound to deliver additional equipment/component to replace with no extra cost claimed.

Control and Protection System

Schedule 1 : 500 kV Thung Song Substation (New 500 kV Control room)

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

- Swing rack type switchboard panel.
- Interposing relay panel and transducer panel.
- Marshalling panel for the tele-protection interface.
- Marshalling panel for the control system.
- Fault Recording System and marshalling panel for fault recording system.
- Marshalling panel for the remote terminal unit.
- GPS receiver panel.
- Outdoor GPS receiver system.
- OFC Interfacing panel (Connected to OFC Interfacing Panel at existing 230 kV Control room).
- 400/230 VAC, 125 VDC power panel and 125 VDC distribution boards.
- Loose equipment as specified in price schedules.
- 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 control and protection system.

31. Design, installation, wiring, test and commissioning of Remote Terminal Units (RTU) and EGAT CCS/ RTU operator console which are supplied by EGAT, whereas configuration shall be designed under EGAT's supervision.
32. Installation of the application software database, control function and display for the Computerized Control System whereas the application software is supplied by EGAT. The installation shall be under EGAT's supervision.
33. Design, supply, installation, wiring, test and commissioning of Ethernet Switch. The quantity of supplied shall be enough for the relays that connected to EGAT's operation LAN. Cables and accessories for interfacing are included.
34. Design, supply, installation, wiring, test and commissioning of GPS receiver which is used as a reference time base to all the equipment referred on Drawing No. TS-E-2. The quantity of supplied shall be sufficient for using with the equipment such as relays, kWh & kVAR meters, FRS and RTU in order to complete the function as required in contract. In addition, The GPS receiver shall properly operate with the Ethernet Switches.
35. Design, supply, installation, wiring, test and commissioning of Optical Fiber Cable of Fault Recording System (FRS) that connection between the new 500 kV FRS System and the existing 230kV FRS System (if available).
36. Design, supply, installation, wiring, test and commissioning of Optical Fiber Cable of Remote Terminal Unit (RTU) that connection between the new 500 kV control room and the existing 230kV control room.
37. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection systems.

Schedule 2 : 230 kV Thung Song Substation (Existing 230 kV Control room)

38. Design, supply, installation, wiring, test and commissioning of complete control and protection system which comprises at least the following equipment.
 - Swing rack type switchboard panel as specified in price schedules.
 - OFC Interfacing Panel (Connected to OFC Interfacing Panel at New 500 kV Control room).
 - 125VDC distribution board.
 - Loose equipment as specified in price schedules.
 - 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 control and protection system.

39. Design, modification, installation, wiring, test and commissioning of the existing control and protection system which comprises at least the following equipment.
 - Swing rack type switchboard panel.
 - Interposing relay panel and transducer panel.
 - Marshalling panel for the tele-protection interface.
 - Enclose type main control board panel.
 - Fault Recording System and marshalling panel for fault recording system.
 - Marshalling panel for the remote terminal unit.
 - 400/230 VAC, 125 VDC power panel and distribution boards.
 - 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 control and protection system.
40. Design, modification of the schematic and wiring diagrams of the additional inputs to the existing Computerized Control System (CCS), including test and commissioning of the completed CCS.
41. Relocation, installation, test and commissioning of the existing 230 kV EGAT CCS/RTU operation and monitoring system from the existing 230 kV control building to the new 500 kV control building. The Relocation, installation, test and commissioning shall be under EGAT's supervision.
42. Design, modification of the schematic and wiring diagrams of the additional inputs to the existing Fault Recording System (FRS), including test and commissioning of the completed FRS.
43. Any modification and interfacing works to the existing metering, control 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. The final drawings shall be submitted as ACAD files.
44. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection systems.
45. Removal of the unused existing protection panel or unused equipment of existing control and protection panel. The removed protection panel shall be neatly kept in a suitable place recommended by EGAT.
46. Unused existing cables shall be removed. The removed cables shall be neatly reeled and kept in a suitable place recommended by EGAT.

Civil and Architectural work

47. Design and construction of

- 47.1 Design and construction of 500 kV GIS building which comprises at least the following :
 - 47.1.1 Structure & foundation. The proper structure can be selected for the design and construction and shall be submitted to EGAT for approval.
 - 47.1.2 RC and/or steel structure for roof.
 - 47.1.3 Fire protection for steel structure shall conform to legal provision, EGAT's specifications and Design manual for substation. Therefore, Fire protection for steel structure specification in Architecture drawing shall be cancelled.
 - 47.1.4 Architecture of the whole building.
 - 47.1.5 The contractor shall construct the building conformed to "IEEE STD-979-1994 (R2004)" (IEEE Guide for Substation Fire Protection).
 - 47.1.6 500 kV GIS Building shall be designed with reference to Dwg. No. SD-GIS-9-01A. But equipment layouts shall conform to electrical drawing (Dwg.No. SE-GIS-0-01-01/01 and Dwg.No.TS-S-2). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.
 - 47.1.7 Size of 500 kV GIS building can be selected for the design and shall be submitted with the proposal in the bidding process.
 - 47.1.8 The design of building shall analyze and take the following aspects into consideration: Site, Environment, Context, Function, Climate (sunlight, wind, rain, heat etc.), Energy efficiency, Safety and including aesthetic of architecture to encourage EGAT corporate identity.
 - 47.1.9 Electricity and illumination system including cable work for illumination, ventilation system and power supply.
 - 47.1.10 Plumbing system for water supply, building drain, vent and storm drain system.
 - 47.1.11 Water supply system for cleaning solar roof top of the building shall have automatic pump with pressure tank and PE water tank. The automatic pump with pressure tank shall have sufficient

capacity and delivery head. The Contractor shall submit water supply design calculation to EGAT for approval.

47.1.12 Miscellaneous including grounding and labeling.

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

47.1.14 Overhead traveling crane with wireless crane remote control of lifting capacity not less than 10.0 metric tons. Overhead traveling crane shall have cat-walk for maintenance the equipment on ceiling.

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

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

47.2 Design and construction of 500/230 kV Control Building.

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

47.2.2 Architecture of the whole building.

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

47.2.4 500/230 kV Control Building shall be designed with reference to Dwg.No. SD-CD-0-01A. Equipment layouts shall conform to electrical drawing (Dwg.No. TYP1A-S-6). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.

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

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

47.2.7 Water supply system for cleaning solar roof top of the building shall have automatic pump with pressure tank and PE water tank. The automatic pump with pressure tank shall have sufficient capacity and delivery head. The Contractor shall submit water supply design calculation to EGAT for approval.

- 47.2.8 Miscellaneous including grounding and labeling.
- 47.2.9 Cable routing and cable support (Cable tray and Cable ladder) installed in cable room and main cable trench.
- 47.2.10 Signboard on building and room name sign on each room.
- 47.2.11 Access floor, shall be heavy-duty area type. All details of material property shall principally conform to the referenced drawings. Provided there are any material's characteristic contradictions between Specification No. 3001 (Civil and Architectural work) and the referenced drawings, then, the material's characteristic shall conform to the referenced drawings.
- 47.2.12 Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).
- 47.2.13 The furniture list shall be added as the follow detail.

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

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

47.3 Design and construction required for a complete 500 kV & 230 kV Gas Insulated substation (GIS) which comprises at least the following :

- 47.3.1 GIB & GIS bushing structure and foundation.
- 47.3.2 Transformer foundation, shunt reactor foundation, specified equipment and steel structure foundations and the others not shown in "For Construction drawings" and/or EGAT's specification.
- 47.3.3 Firewall with Take-off foundation conformed to NFPA 850.
- 47.3.4 500 kV Terminator support foundation.
- 47.3.5 Common Control Cabinet foundation.
- 47.3.6 Road, drainage system and drainage system for cable trench.
- 47.3.7 Water supply system.
- 47.3.8 Cable tray for transformer, underground cable in HDPE duct.
- 47.3.9 Oil pit with black steel spiral-seam pipes (TIS 427-2531) with protection method according to AWWA C217, C205.

- 47.4 Construction required for a complete 500 kV & 230 kV Gas Insulated substation (GIS) which comprises at least the following :
- 47.4.1 Transformer loading and Dead man hook for loading transformer.
 - 47.4.2 Wire mesh fence.
 - 47.4.3 Crushed rock surfacing.
 - 47.4.4 Cable trench.
 - 47.4.5 Remove existing concrete fence.
 - 47.4.6 Lamp post for fence and access road lighting LED type foundation.
 - 47.4.7 Cabinet with 2 sets of 50 lbs wheel fire extinguisher.
 - 47.4.8 Water storage tank for fire protection system (capacity 250 cu.m.)
 - 47.4.9 Foam house and accessories.
 - 47.4.10 Fire pump house.
 - 47.4.11 Oil separator.
 - 47.4.12 Site office.
 - 47.4.13 Garage house 5.50 x 12.00 m (4 cars).
 - 47.4.14 Equipment support structure foundation.
 - 47.4.15 Guard rail.
- 47.5 The drawings and calculation of all building shall be verified with adequate details for intended application and submitted to EGAT for approval.
- 47.6 All design works and the fabrication drawings for all steel structures shall be submitted to EGAT for approval.
- 47.7 All design, construction and testing shall conform to Specification No. 3001 : Civil and Architectural Work.
- 47.8 EGAT's Soil Investigation Report attached to the Contract is a document that can be a reference for design, however; the review of the soil investigation report shall be under responsibility of the Contractor and the warranty of work shall remain following all obligations as specified in the Contract.
- 47.9 All foundations shall be as specified on lay out drawing except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.

- 47.10 The contract price will be adjusted (added or reduced) in case that the soil investigation results to be used for the design works is different from the lay out and standard drawings.
- 47.11 The Contractor shall remove all debris from construction material and other work in order to make the site clean and be in the condition acceptable to EGAT.
- 47.12 The layout of Dwg.No TS-C-3, TS-C-6 and TS-C-9 shall be designed with reference to Dwg.No. TYP1A-C-3.1, TYP1A-C-6 and TYPIA-C-9 respectively.
- 47.13 Three minutes 3D animation presentation file (MP4, resolution not less than 1440 p; 2500 X 1440) demonstrating details of switchyard and interior and exterior buildings shall be arranged, with reference to Substation 3D Animation.mp4 attached file.
- 47.14 According to the Contract Document Section G-3 : Contractor's Office and Other Construction Facilities; the detail in paragraph 3 shall be changed as follows : the Contractor shall provide for EGAT an office container at the site during construction with a minimum space of 36 square meters for office area, 24 square meters for conference room which shall both be air-conditioned and 4 square meters for toilet. The facilities as shown on the section G-3 are required for two sets.

Fire protection system

- 48. Design, supply and installation/construction of Fire protection system for 500 kV GIS building and 500/230 kV Control Building :
 - 48.1 500 kV GIS building shall consist of video image smoke detector system, optical beam smoke detector and aspirated smoke detector.
 - 48.2 500/230 kV Control building shall consist of Total Flood Clean Agent Fire Suppression System with heat detector, addressable type smoke detector and aspirated smoke detector.
 - 48.3 Fire protection system of 500 kV GIS building and 500/230 kV Control Building shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected device, shown and recorded at control room in 500/230 kV Control Building. The installation practice shall be in accordance with the last edition of NFPA 72.
 - 48.4 There shall be sounder and beacon on the roof of every building.

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

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

Zone 1: Equipment (Control/Relay) Room ;

Zone 2: Electrical Room ;

Zone 3: Under Raised Floor ;

Zone 4: Battery Room ;

Zone 5: Cable Room ;

Zone 6: Inert Gas Room

Other zone (If required)

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

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

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

i. Air Sampling Smoke Detector.

- (1) Shall consist of a high sensitivity type detector, using light scatter technology.
- (7) Detection system must be included in all control cabinet and can locate a scene.
- (13) The minimum sensitivity settings for a single sampling hole are so that the detection system alarm at 1.5% obs/ft (4.95% obs/m). A sampling hole maximum coverage area is 400.0 ft² (37.2 sq.m).
- (14) Maximum transport time from the most remote port to the detection unit of an air-sampling system shall be a maximum of 90 seconds.

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

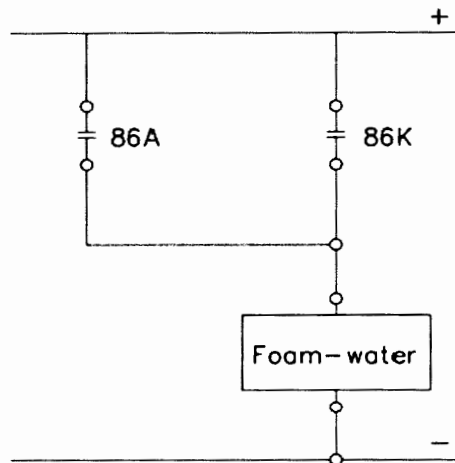
48.7.1 NFPA 2001 : Clean Agent Fire Extinguishing Systems.

48.7.2 NFPA 70 : National Electrical Code.

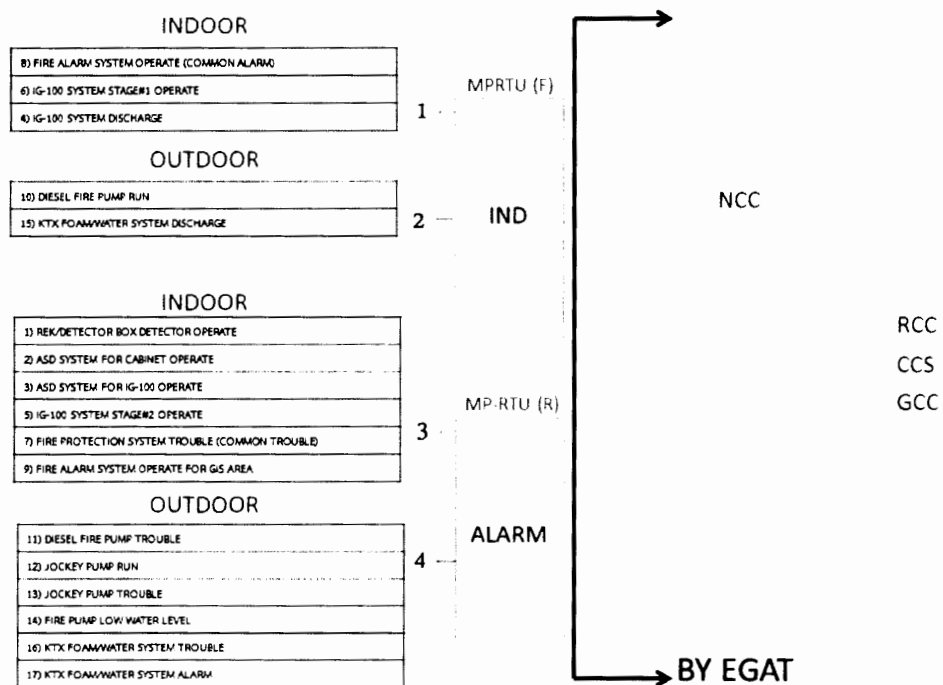
48.7.3 NFPA 72 : National Fire Alarm Code.

- 48.7.4 NFPA 75 : Standard for the Fire Protection of Information Technology Equipment.
- 48.7.5 NFPA 76 : Standard for the Fire Protection of Telecommunications Facilities.
- 48.7.6 EGAT's Standard Design Manual of Fire Protection and Suppression for Substation. (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานี่ไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)
- 48.7.7 IEEE Std 979: IEEE Guide for Substation Fire Protection.
- 48.7.8 NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Substations.
- 48.8 There shall be one control panel for fire detection system and IG-100 fire suppression system for each room which is protected by the IG-100 fire suppression system.
- 48.9 There shall be a protective clear polycarbonate cover which can be immediately lifted or opened for all IG-100 manual release stations.
- 48.10 CO₂ Portable fire extinguishers shall be UL listed or FM approved.
49. Design, supply and installation/construction of Fire protection system for the switchyard to meet the requirement as specified in IEEE Guide for Substation Fire Protection : IEEE Std 979-1994 (R2004) and all requirements of NFPA and EGAT's Standard Design Manual of Fire Protection and Suppression for Substation. (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานี่ไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)
50. Design, supply and installation/construction of Fire protection system for the Transformer and Shunt reactor : The Foam-Water Spray System shall comply with the following ;
- 50.1 Foam water spray system: NFPA 13, NFPA16 & NFPA 850.
- 50.2 Bladder tank Vessel construction Standards : Carbon steel to ASME code section VIII for unfired pressure vessel.
- 50.3 Nozzles : NFPA 16 and as per Manufacturer's Recommendation.
- 50.4 Detection system : Air Expansion Linear Heat Detection System (LHB).
- 50.5 Equipment for system : FM approved, UL Listings, Vds.

- 50.6 EGAT's Standard Design Manual of Fire Protection and Suppression for Substation. (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย).
- 50.7 Foam-water spray system provided for Transformer/Shunt Reactor shall be designed for a density of 10.2 litre/min-sq.m over the exposed surface at the Transformer/Shunt Reactor.
- 50.8 There shall be one linear heat detector box for each transformer.
- 50.9 There shall be one control panel for fire detection system and foam/water spray system for each transformer which is protected by the foam/water spray system.
51. Design, supply and installation of Fire Pump System (conformed to NFPA 14, 20, 24, 72).
52. 250 cu.m water storage tank, fire pump, and jockey pump shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected devices, shown and recorded at control room in 500/230 kV Control building. The installation practice shall be in accordance with the latest edition of NFPA 72.
53. 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.
54. There shall be one graphic annunciator which displays alarm, discharge and trouble signals of fire alarm system of other buildings, fire pump houses and transformers at the building where control room locates.
55. 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.
56. For Control System Logic as shown on specification 3001-13.4 item 4.1 shall be changed to the new detail as following ;
- (4.1) In case of fire, heat detector and the tubular expansion detector first give alarm. If rate of rise/fixed temp in heat detector/tubular expansion detector sense fire condition, there shall be alarm in control room and the detected transformer and/Shunt Reactor shall be tripped before applying Foam-Water spray as the condition shown in the diagram below ;



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



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

Solar Rooftop System

59. The materials and equipment for solar rooftop system installation shall meet electrical criteria and standard qualifications in order to safely and properly install the system in buildings by professional installer.

60. The builder/Contractor shall design safe access for routine inspection and maintenance and there shall be accessible paths between solar cell arrays for operators to safely and conveniently work.
61. The steel structure materials shall be hot dip galvanizing by following ASTM standard.
62. The tools of construction shall be both properly assembled and disassembled.
63. The equipment of the PV solar module attached to the construction shall be in proper size and shall be made from stainless steel or corrosion prevention materials whose grade is not below 304 stainless steel or AL6005-T5 or equivalent.
64. The PV module support structure shall be strongly, durably and securely fastened to the roof structure. All structural parts shall be designed for wind resistance not less than the maximum wind speed of tropical storm, according to official declaration of Meteorology Department or regulations relevant to the area, if any.

Testing and Commissioning

65. Testing and commissioning of all equipment required to make the substation function properly.
66. Dynamic load test (DLT) conformed to ASTM D4945-89 shall be applied to at least 2% of driven piles (if driven pile type is required) except driven pile of fence and lamp post.
67. Seismic load test (sonic integrity test) conformed to ASTM D5882-96 shall be applied to all bored piles (if bored pile type is required).
68. The Contractor shall perform a static load test for GIS building foundation in accordance with ASTM D1143 (if pile type foundation is required).
69. Test and commissioning for inert gas system in electrical room of 230/115 kV Control building.
70. Test and commissioning for fire protection system in switchyard.
71. Test and commissioning for foam water spray of each Transformer/Shunt reactor.
72. Test and commissioning for fire protection system of fire pump system.

Other work

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

74. The removal of the equipment in the existing conventional substation. Details of removal are shown on the bidding document drawings.
75. All removed equipment from removal and replacement shall be carefully packed by the Contractor and returned to EGAT at the construction site.
76. Modification to Junction box supporting structure (JB001) for the installation of Safety switches.
77. Modification to Junction box supporting structure (JB003) for the installation of Outdoor Receptacle Box (ORB1 and ORB3).
78. Modification to 22kV current transformer support structure (CS201) for installation of 22kV current transformer and 22kV voltage transformer.
79. Modification to 230kV current transformer support structure foundation for installation of 230kV bus pole structure (BP803).

Work not included in this Contract

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

1. Supply and installation of 500/230-22 kV auto-transformers “KT6A, KT7A”, except cabling from the common control cubicle for autotransformer (CCC) to the associated equipment.
2. Supply and installation of the 525kV Shunt Reactors and their Neutral Reactors, except cabling from the control cubicle of the Shunt Reactors to the associated equipment.
3. The stringing work for the connection between the 500 kV Substation take-off structures and the dead-end tower of the transmission lines.
4. The stringing work for the connection between the 230 kV Substation take-off structures and the dead-end tower of the transmission lines.
5. Supply station post and suspension insulators.
6. Supply of Remote Terminal Units (RTUs), EGAT CCS/ RTU operator console and application software.