

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย

REGISTRATION FORM

INVITATION TO BID NO. RTS2-S-24

FOR SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2
FIRE PROTECTION SYSTEM PHASE 3

AVAILABLE DURATION FOR PURCHASING July 11, 2019 TO August 23, 2019

PRICE USD 160.- OR THB 5,000.-

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 :			
LOCAL REPRESENTATIVE (ตัวแทนในประเทศ)			
ADDRESS (ที่อยู่)		TAX ID :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:	TEL.:
E-mail :			
FOR PROCUREMENT OFFICER		CHANGE OF BIDDER'S NAME	TAX ID :
BIDDER'S LETTER NO. :		DATED :	
NEW BIDDER'S NAME (ชื่อผู้ซื้อเอกสารเปลี่ยนเป็น)			
ADDRESS (ที่อยู่)		COUNTRY :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:	TEL.:
E-mail :			
LOCAL REPRESENTATIVE (ตัวแทนในประเทศ)			
ADDRESS (ที่อยู่)		TAX ID :	
ATTN. (ผู้รับผิดชอบ):		FAX NO.:	TEL.:
E-mail :			
FOR PROCUREMENT OFFICER		FOR PURCHASER	
Procurement Officer (ผู้ส่งมอบเอกสาร)		Document received by (ผู้รับมอบเอกสาร)	



INVITATION TO BID NO. RTS2-S-24
SUPPLY AND CONSTRUCTION OF 115 kV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2
FIRE PROTECTION SYSTEM PHASE 3

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 : Udon Thani 2 Substation

Medium Cost (including Value Added Tax and other expenses) : THB 334,000,000.-

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

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 July 11, 2019 to August 23, 2019 at USD 160.- or THB 5,000.- 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.

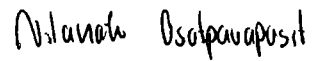
Nilanida Sutpavaposit

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, October 1, 2019 and will be opened publicly at 10:00 hrs.

ELECTRICITY GENERATING AUTHORITY OF THAILAND

July 4, 2019



(Mrs. Nilanate Osotpavaposit)

Chief, International Procurement Department -
Transmission Segment



ประกาศการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เรื่อง ประกวดราคาจ้าง เลขที่ RTS2-S-24

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย (กฟผ.) มีความประสงค์จะจัดหาและจ้างก่อสร้างสถานีไฟฟ้าแรงสูง 115 KV อดุทธธานี 2 สำหรับโครงการปรับปรุงและขยายระบบส่งไฟฟ้าที่เชื่อมสภาพตามอายุการใช้งานระยะที่ 2 และแผนงานติดตั้งระบบดับเพลิง สถานีไฟฟ้าแรงสูง ระยะที่ 3 โดยทำสัญญาแบบปรับราคาได้ (ค่า k) โดยใช้งบประมาณ กฟผ.

สถานที่ก่อสร้าง : สถานีไฟฟ้าแรงสูงอดุทธธานี 2

ราคากลาง (รวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ) : 334,000,000.- บาท

คุณสมบัติของผู้เสนอราคา

1. ต้องเป็นนิติบุคคลผู้มีอาชีพรับจ้างตามประกวดราคาจ้างดังกล่าว และต้องไม่เป็นผู้ทำงานซึ่งสำนักนายกรัฐมนตรีได้แจ้งเวียนชื่อไว้ หรือต้องไม่เป็นผู้ที่ กฟผ. ห้ามติดต่อหรือห้ามเข้าเสนอรราคา หรือต้องไม่เป็นผู้ที่ได้รับผลของการสั่งให้นิติบุคคลหรือบุคคลอื่นเป็นผู้ทำงานตามคำสั่ง กฟผ.
2. ต้องไม่เป็นผู้มีผลประโยชน์ร่วมกันกับผู้เสนอรการรายอื่น ณ วันประกาศประกวดราคาครั้งนี้เป็นต้นไป หรือต้องไม่เป็นผู้กระทำการอันเป็นการขัดขวางการแข่งขันราคาอย่างเป็นธรรมในการดำเนินการประกวดราคาครั้งนี้
3. ต้องไม่เป็นที่ปรึกษาของ กฟผ. หรือมีส่วนร่วมในบริษัทที่ปรึกษาของ กฟผ. ในงานนี้ หรือต้องไม่มีผู้ปฏิบัติงาน กฟผ. เข้าไปมีส่วนร่วมในกิจการของผู้เสนอรราคา ไม่ว่าจะในฐานะผู้ถือหุ้นที่มีสิทธิควบคุมการจัดการ กรรมการ ผู้อำนวยการ ผู้จัดการ พนักงาน ลูกจ้าง ตัวแทน หรือที่ปรึกษา ยกเว้น ในกรณีที่ผู้ปฏิบัติงานได้รับคำสั่งอย่างเป็นทางการจาก กฟผ. ให้ไปปฏิบัติงานหรือเข้าร่วมในกิจการของผู้เสนอรราคา
4. ต้องไม่เป็นผู้ได้รับเอกสิทธิ์หรือความคุ้มกัน ซึ่งอาจปฏิเสธไม่ยอมขึ้นศาลไทย เว้นแต่รัฐบาลของผู้เสนอรราคาได้มีคำสั่งให้สละสิทธิ์และความคุ้มกันเช่นนั้น
5. ผู้ประสงค์เข้าประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม (Joint Venture or Consortium) จะต้องดำเนินการทุกขั้นตอนของการประกวดราคา ในนามของกิจการร่วมค้าหรือกิจการค้าร่วม ตั้งแต่การเสนอรราคาจนถึงสิ้นสุดข้อผูกพันกับ กฟผ.

การขายเอกสารประกวดราคา

ผู้สนใจติดต่อขอทราบรายละเอียด เพื่อตรวจสอบคุณสมบัติของผู้เสนอรราคา และขอซื้อเอกสารประกวดราคา ในราคาชุดละ 5,000.- บาท ได้ที่ แผนกจ้างงานวิศวกรรมระบบส่ง (ห้อง 1202/2 ชั้น 12 อาคาร ท.101) กองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง ฝ่ายจัดซื้อจัดจ้างและบริหารพัสดุ การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เชียงสะพานพระราม 7 จังหวัดนนทบุรี ในวันทำการระหว่างเวลา 08:00 น. ถึง 15:00 น. ตั้งแต่วันที่ 11 กรกฎาคม 2562 ถึงวันที่ 23 สิงหาคม 2562 หรือสอบถามทางโทรศัพท์ หมายเลข 0 2436 0242 หรืออีเมลล์ procurement.tse@egat.co.th ทั้งนี้ สามารถ download แบบฟอร์มลงทะเบียนผู้ซื้อเอกสารประกวดราคาได้ที่เว็บไซต์ <http://www4.egat.co.th/fprocurement/biddingeng/>

พินิจ โสภณ ช่าง

การยื่นซองประกวดราคา

กำหนดยื่นซองประกวดราคา ในวันที่ 1 ตุลาคม 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 4 กรกฎาคม 2562

ปิยนุช โคตรทอง

(นางนิลเนตร ไอสถกาวภูษิต)

หัวหน้ากองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง

ตารางแสดงวงเงินงบประมาณที่ได้รับจัดสรรและราคากลาง(ราคาอ้างอิง)
ในการจัดซื้อจัดจ้างที่มีไขงานก่อสร้าง

1. ชื่อโครงการ ประกวราคาเลขที่ RTS2-S-24
งานจัดหาและจ้างปรับปรุงสถานีไฟฟ้าแรงสูง 115 KV อุดรธานี 2
โครงการปรับปรุงและขยายระบบส่งไฟฟ้าที่เสื่อมสภาพตามอายุการใช้งานระยะที่ 2
และแผนงานติดตั้งระบบดับเพลิงสถานีไฟฟ้าแรงสูง ระยะที่ 3
/หน่วยงานเจ้าของโครงการ ฝ่ายแผนงานและโครงการระบบส่ง การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย
2. วงเงินงบประมาณที่ได้รับจัดสรร
โครงการปรับปรุงและขยายระบบส่งไฟฟ้าที่เสื่อมสภาพตามอายุการใช้งานระยะที่ 2
งบประมาณ 21,900 ล้านบาท
แผนงานติดตั้งระบบดับเพลิงสถานีไฟฟ้าแรงสูง ระยะที่ 3 งบประมาณ 1,274.22 ล้านบาท
3. วันที่กำหนดราคากลาง 7 มิถุนายน 2562 (วันที่ ชสพ. อนุมัติ)
ราคารวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ เป็นเงิน 334,000,000.00 บาท ราคา/หน่วย ตามเอกสารแนบ
4. แหล่งที่มาของราคากลาง
หลักเกณฑ์การกำหนดราคากลางการจัดซื้อและจัดจ้างงานก่อสร้างระบบส่งไฟฟ้าของสายงานระบบส่ง
5. รายชื่อเจ้าหน้าที่ผู้กำหนดราคากลาง
 - 5.1 นายฉัตรชัย เขาวนาธิคม หมฟ-ส. กวอ-ส.
 - 5.2 นายธิติวัดณ์ เบญจวงศ์รัตน์ หสก-ส. กวอ-ส.
 - 5.3 นายภาณุวัฒน์ ลิขิตผลผดุง หอต-ส. กวอ-ส.
 - 5.4 นายสุริยะ ประงษ์เมือง หวอ-ส. กวอ-ส.
 - 5.5 นายเมธา รักปาน กวป-ส.
 - 5.6 นางรัมภา สุนทรินทุ กวธ-ส.
 - 5.7 นางอุบลรัตน์ ต้นเกตุ กวส-ส. อรส.

หมายเหตุ ค่าใช้จ่ายอื่นๆ ได้แก่ ค่าใช้จ่ายที่ กฟผ. ต้องจ่ายตามวิธีการพิจารณาเปรียบเทียบราคาที่กำหนดไว้ในเอกสารประกวดราคา เช่น อากรขาเข้า เป็นต้น


นางสาววัลลภา ชีวธนาครณ์กุล
ทจตส-ท.

- 4 ก.ค. 2562

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978-099.

MEDIUM COST FOR BID NO. RTS2-S-24
SUMMARY OF BID PRICE
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2 AND
FIRE PROTECTION SYSTEM PHASE 3

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	115 KV UDON THANI 2 SUBSTATION	THB	83,846,404.54	106,459,023.86	62,592,970.91	417,313.29	42,263,413.57
2	115 KV UDON THANI 2 SUBSTATION (FIRE PROTECTION SYSTEM PHASE 3)	THB			15,189,239.97		
	BID PRICE	THB	83,846,404.54	106,459,023.86	77,782,210.88	417,313.29	42,263,413.57
	OTHER EXPENSES	THB	1,676,928.09	XXXXX	XXXXX	XXXXX	XXXXX
	VAT	THB	5,986,633.28	7,452,131.67	5,444,754.76	29,211.93	2,958,438.95
	SUMMARY OF BID PRICE	THB	91,509,965.91	113,911,155.53	83,226,965.64	446,525.22	45,221,852.52
	TOTAL MEDIUM COST	THB	334,316,464.82				
	TOTAL MEDIUM COST (ROUND)	THB	334,000,000.00				

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.

นางสาววัลลภา ชีวชนากรณ์กุล

ทจดส-ท.

- 4 0.0. 2562

MEDIUM COST FOR BID NO. RTS2-S-24
SCHEDULE 1 : 115 KV UDON THANI 2 SUBSTATION
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

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	78,903,736.34	104,423,785.86			42,263,413.57
PART 1C : CIVIL WORK				62,592,970.91		
PART 1D : SUPPLY OF SPARE PARTS	THB	4,942,668.20	2,035,238.00		417,313.29	
TOTAL PRICE	THB	83,846,404.54	Baht 106,459,023.86	Baht 62,592,970.91	Baht 417,313.29	Baht 42,263,413.57

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นางสาวลลิตา ชัยชนะกุล

หน้า ๗

- 4 ก.ค. 2562

- Project 1-1C1 -

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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

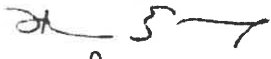
Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB1 : Power Transformer and Marshalling Control Cubicle	THB		156,000.00	20,280.00
Schedule 1AB2 : Distribution Transformer	THB		979,000.00	127,270.00
Schedule 1AB4 : Surge Arrester	THB	468,000.00		60,840.00
Schedule 1AB5 : Current Transformer and Junction Box	THB	6,237,000.00	773,600.00	911,378.00


นางสาววัลลภา ชีวนาครณ์กุล

ทดตส-ท.

- 4 ก.ค. 2562

- Project 1-1C2 -


7 ส.ค. 62

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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht Amount
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB6 : Coupling Capacitor Voltage Transformer, Coupling Capacitor, Voltage Transformer and Junction Box	THB	5,135,700.00	694,250.00	757,893.50
Schedule 1AB9 : Power Circuit Breaker	THB	3,147,267.20		409,144.74
Schedule 1AB10 : Disconnecting Switch	THB	3,248,423.20	828,396.80	529,986.60
Schedule 1AB11 : Power Fuse, Fuse Link and Hook Stick	THB			62,363.73

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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

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	THB		1,472,647.00	191,444.11
Schedule 1AB13 : Stationary Battery and Battery Charger	THB	544,500.00	373,647.96	119,359.23
Schedule 1AB14 : Substation Steel Structure	THB		1,262,755.12	1,032,236.53
Schedule 1AB15 : Insulator	THB			440,739.59


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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

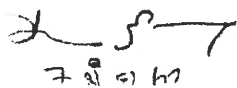
Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB16 : Cable Terminations	THB	836,121.00		242,538.73
Schedule 1AB17 : XLPE Power Cable	THB		3,826,680.00	1,036,392.50
Schedule 1AB18 : Low Voltage Cable and Conductor	THB		63,872,086.08	17,298,689.98
Schedule 1AB19 : Switchyard Lighting Fixtures	THB		1,019,947.50	331,482.94



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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

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		1,648,825.20	446,556.83
Schedule 1AB21 : Bus Fitting	THB	1,731,506.46		468,949.67
Schedule 1AB22 : Grounding Material	THB	543,694.80	1,463,118.36	543,511.90
Schedule 1AB23 : Substation Miscellaneous	THB	201,331.68	508,050.84	192,124.43

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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

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	THB		22,038,348.00	2,293,734.60
Schedule 1AB25 : Fault Recording System	THB		2,604,383.00	260,438.00
Schedule 1AB28 : Compact Switchgear	THB	44,684,277.00		5,808,956.01
Schedule 1AB34 : 48 VDC Stationary Battery, Battery Charger and DC Power Panel	THB		490,000.00	75,000.00

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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

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 1AB35 : Communication Cable	THB		412,050.00	717,480.00
Schedule 1AB37 : Medium Voltage Switchgear	THB	12,125,915.00		1,576,368.95
Schedule 1AB38 : Remote Terminal Unit	THB			855,253.00
Schedule 1AB39 : Commissioning	THB			2,993,000.00

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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1AB : SUPPLY AND INSTALLATION OF SUBSTATION EQUIPMENT
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

Description	Currency	Supply of Equipment		Local Transportation, Construction and Installation (excluding VAT) Baht Amount
		Foreign Supply	Local Supply	
		CIF Thai Port	Ex-works Price (excluding VAT) Baht	
		Amount	Amount	
Schedule 1AB40 : Installation of Equipment and Steel Structure Supplied by EGAT	THB			2,460,000.00
PART 1AB	THB	78,903,736.34	Baht 104,423,785.86	Baht 42,263,413.57



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MEDIUM COST FOR BID NO. RTS2-S-24
PART 1C : CIVIL WORK
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

Description	Local Currency (excluding VAT) Baht
	Amount
Schedule 1C1 : Foundation Work	6,266,362.25
Schedule 1C2 : Cable Trench	6,834,688.26
Schedule 1C3 : Control Building	39,063,987.65
Schedule 1C4 : Earth Work, Road and Crushed Rock Surfacing	2,340,012.91
Schedule 1C5 : Water Supply System	213,407.41
Schedule 1C6 : <u>Drainage</u> System	6,436,292.88
Schedule 1C7 : Special Construction Works	1,199,599.82
Schedule 1C8 : Miscellaneous	238,619.73
PART 1C	Baht 62,592,970.91

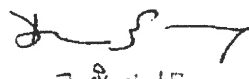


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**MEDIUM COST FOR BID NO. RTS2-S-24
PART 1D : SUPPLY OF SPARE PARTS
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2**

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 1D9 : Spare Parts for Power Circuit Breaker	THB	380,679.20		19,033.98
Schedule 1D24 : Spare Parts for Control and Protection System			1,614,715.00	80,729.00
Schedule 1D25 : Spare Parts for Fault Recording System			420,523.00	21,021.00
Schedule 1D28 : Spare Parts for Compact Switchgear	THB	4,064,890.00		264,217.86
Schedule 1D37 : Spare Parts for Medium Voltage Switchgear	THB	497,099.00		32,311.45
PART 1D นางสาววัลลภา ชิวชนาธรรมกุล ทจตส-ท.	THB	4,942,668.20	Baht 2,035,238.00	Baht 417,313.29

MEDIUM COST FOR BID NO. RTS2-S-24
SCHEDULE 2 : 115 KV UDON THANI 2 SUBSTATION (FIRE PROTECTION SYSTEM PHASE 3)
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
FIRE PROTECTION SYSTEM PHASE 3

Description	Currency	Supply of Equipment		Local Currency (excluding VAT) Baht	Local Transportation (excluding VAT) Baht	Local Transportation, Construction and Installation (excluding VAT) Baht
		Foreign Supply	Local Supply			
		CIF Thai Port	Ex-works Price (excluding VAT) Baht			
		Amount	Amount			
PART 2C : CIVIL WORK				15,189,239.97		
TOTAL PRICE			Baht	Baht 15,189,239.97	Baht	Baht



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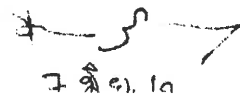
MEDIUM COST FOR BID NO. RTS2-S-24
PART 2C : CIVIL WORK
SUPPLY AND CONSTRUCTION OF 115 KV UDON THANI 2 SUBSTATION
FIRE PROTECTION SYSTEM PHASE 3

Description	Local Currency (excluding VAT) Baht
	Amount
Schedule 2C7 : Special Construction Works	465,224.77
Schedule 2C9 : Fire Protection System	14,724,015.20
PART 2C	Baht 15,189,239.97



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Important Information
for
Invitation to Bid No. RTS2-S-24

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

Article F-11. Payment:

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

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

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

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

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

DATA SHEET

for

Invitation to Bid No. RTS2-S-24

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

1. Article B-3. Bid Security

The amount of bid security shall be USD 530,060.- or THB 16,700,000.-.

2. 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 No. 1 : 115 kV Udon Thani 2 Substation or Schedule No. 2 : 115 kV Udon Thani 2 Substation (Fire Protection System Phase 3), the liquidated damages shall be at the rate of one-tenth of one (0.10) per cent of the total Contract Price for Schedule No. 1 : 115 kV Udon Thani 2 Substation and Schedule No. 2 : 115 kV Udon Thani 2 Substation (Fire Protection System Phase 3) for each Day of delay. This sum is payable regardless of the actual loss and/or damages incurred.

3. 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.

4. Defective Equipment to be replaced with the whole new set

Not Applicable

ELECTRICITY GENERATING AUTHORITY OF THAILAND

Nonthaburi
Thailand

INVITATION TO BID NO. RTS2-S-24

SUPPLY AND CONSTRUCTION OF 115 kV UDON THANI 2 SUBSTATION

TRANSMISSION SYSTEM EXPANSION AND RENOVATION PROJECT PHASE 2

FIRE PROTECTION SYSTEM PHASE 3

Invitation

The Electricity Generating Authority of Thailand (EGAT) hereby invites sealed bids for supply and construction of 115 kV Udon Thani 2 Substation under Transmission System Expansion and Renovation Project Phase 2 and Fire Protection System Phase 3 as described herein in accordance with terms, conditions and Specifications described in these Bidding Documents.

Work Description

The supply and construction of 115 kV Udon Thani 2 Substation will be on a supply and construction basis, the Contractor shall be responsible for complete supply, installation, construction and also engineering design work to the standard specified and best modern practice. The substations to be constructed and the scope of work under this Invitation are described in Section H. Scope of Work.

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 not be a Jointly Interested Bidder with other Bidders as from the date of EGAT's issuance of the Invitation to Bid, or shall not be a person who undertakes any action as an "Obstruction of Fair Price Competition" as defined in Additional Regulation for this Invitation.
- f. The Bidder shall not either be EGAT's consultant or involving in EGAT's consultancy company under this Invitation, or have EGAT's personnel involved in his business as shareholder having voting right that can control his business, director, manager, officer, employee, agent or consultant except for the ones who are officially ordered by EGAT to act or participate therein.
- g. The Bidder shall not be the person who is privileged or protected not to be taken any legal proceeding under Thai Court; provided that such Bidder's government declares that such special privilege is waived.
- h. In case of a joint venture or consortium, the Bidder shall carry out all the work under such formation from the time of bidding until the fulfillment of the Contract.
- i. *The Bidder shall be a purchaser of the bidding documents from EGAT. For a joint venture or consortium, only one (1) member of the joint venture or consortium is required to purchase the bidding documents.*

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

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 115 kV or above conventional or GIS substation, with its overall performance satisfactory to EGAT;
- 2) Having experience in executing at least two (2) contracts as contractor (not as subcontractor) for supply and construction of 115 kV or above conventional or GIS substation with other Electricity Authorities of Thailand or in an overseas country (not his own country).

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

- c. Further to b.1) and b.2) mentioned above, having a record of experience within the last ten (10) years on the technical knowledge and practical experience on design, construction and installation of Equipment of a 115 kV or above complete conventional or GIS substation. Bidder shall also demonstrate his capacity to perform Work.

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

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

- d. The Bidder shall propose 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 thru I.d.8 below. Otherwise, it shall not be acceptable and shall be sufficient grounds for rejection.

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

5. For 115 kV Ratings of Gas-Insulated Switchgear (GIS). 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 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, busbar current of 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) 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 an 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 an 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.

- 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 115 kV Ratings of Power Circuit Breaker *and Compact Switchgear* shall be manufactured by the qualified manufacturers who shall fulfill the following requirements :

- 6.1 Having one of the following qualifications :

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

OR

- 6.1.2 Having a supply record of Equipment of the type 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 an 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 an 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 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 an

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 Control and Protection System, having the following qualifications:

8.1 Being local manufacturer.

8.2 Having one of the following qualifications :

8.2.1 Having a supply record of successful operation/use in EGAT's or other Electricity Authorities of Thailand's 110 kV or above Transmission System for at least three (3) consecutive years and at least three (3) units of each type of Protective Relay Panels having similar characteristics to the ones specified herein.

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.13 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 33, 22 and 11 kV ratings of following Equipment : Metal-Clad SF₆ Gas Insulated Switchgear, Power Circuit Breaker, Instrument Transformer, Disconnecting Switch and Surge Arrester

Having one of the following qualifications :

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

OR

- 5.2 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 an overseas country (not his own country) and at least three (3) three phase sets. The detailed information of the development or modification shall be submitted with his proposal. EGAT,

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

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

6. 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, XLPE Power Cable, Power Cable, Control Cable and Switchboard Wire, Lighting Cable, Copper Ground Wire, Overhead Ground Wire, Aluminum Conductor, Optical Fiber Cable, Switchyard Lighting Fixtures, Aluminum Tube, Compression Connector and Miscellaneous Hardware, Bus Fittings, Ground Rod, Thermite Welding Material, Grounding Hardware, Conduit and Conduit Fittings

- 6.1 Being local manufacturer for the following Equipment :

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

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

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

- 6.3 Having one of the following qualifications :

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

OR

- 6.3.2 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).

7. For Insulator

Having one of the following qualifications :

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

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

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

OR

7.2 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).

8. For Stationary Battery

Having one of the following qualifications :

8.1 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

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

9. For above 33kV through 115 kV Outdoor Type Cable Termination and Cable Termination for GIS.

Having one of the following qualifications :

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

OR

9.2 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.

10. 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.

11. For Fault Recording System.

11.1 Having one of the following qualifications :

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

OR

11.1.2 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.

11.2 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

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

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

13.1 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.

13.2 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.

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

13.3.1 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

13.3.2 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.

13.4 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"

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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.		

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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.

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	INGETTEAM	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				

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	

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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.

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EGAT ACCEPTED FAULT RECORDING SYSTEM LIST

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

Note

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

EGAT ACCEPTED MANUFACTURER LIST FOR PROTECTIVE RELAY

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

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EGAT ACCEPTED MANUFACTURER LIST FOR FAULT RECORDING SYSTEM

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

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SECTION H
SCOPE OF WORK

TC-SUB-01 (Rev.1)
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SCOPE OF WORK

H-1. General

<u>No.</u>	<u>Substation</u>	<u>Page</u>
1.	115 KV UDON THANI 2 SUBSTATION (UD2) (Job No. RTS2-01-S10)	H1-1
2.	115 KV UDON THANI 2 SUBSTATION (FIRE PROTECTION SYSTEM PHASE 3) (Job No. FPS2-01-S19)	H2-1

3,

1. UDON THANI 2 SUBSTATION (UD2) (JOB NO. RTS2-01-S10)

General

Udon Thani 2 Substation is located on Udon Thani – Sakon Nakhon Road, Nong Na Kham Sub-district, Muang District, Udon Thani Province, Thailand.

The renovation of the Udon Thani 2 Substation project is to modify existing 115 kV conventional substation from Main-and-transfer bus scheme to Double-bus-double-breaker scheme by using 115 kV compact switchgear.

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

Schedule 1

The modified 115 kV Udon Thani 2 Substation shall consist of 115 kV conventional substation and the bus arrangement shall be Double-bus-double-breaker scheme which consists of eleven (11) feeders as follows:

- Two (2) feeders for 115 kV line to Nam Phong 1 Substation
- Two (2) feeders for 115 kV line to Nong Khai Substation
- Two (2) feeders for 115 kV line to Udon Thani 3 Substation
- Two (2) feeders for 115 kV line to Nong Bua Lam Phu Substation
- Two (2) feeders for 115 kV to power transformer KT1A and KT2A
- One (1) feeder for 115 kV line to PEA

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 these 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.

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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

115 kV Conventional Substation

1. Design, supply and installation of equipment required for a complete 115 kV Conventional Substation, except 22 kV power fuses and some steel structures that shall be supplied by EGAT and installed by the Contractor as noted in the bidding document drawings.
2. Design, supply and installation of equipment required for a complete 22 kV power supply system, including raceways.
3. Design, supply and installation of miscellaneous hardware for the connection equipment required for a complete 115 kV substation and 22 kV system.
4. Design, supply and installation of 22 kV XLPE cable system which comprises at least the following:
 - 4.1 Design, supply and installation of the 22 kV XLPE cables in a 22 kV system including raceways, cable spacers, cable cleats, cable terminations, and all related equipment, cable supporting structures and miscellaneous hardware. The covers of 22 kV XLPE cable trenches shall be concrete.
 - 4.2 The 22 kV XLPE cable shall be single-core with copper conductor. Conductor's sizes refer to the bidding drawing.
 - 4.3 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.
 - 4.4 Installation of 22 kV XLPE power cables shall consider the minimum bending radius. The minimum bending radius (at laying and when installing) shall be recommended by the manufacturer.

- 4.5 Design, supply and installation the equipment to protect the power cable from the surge voltage.
- 4.6 The design and calculation of the 22 kV cable system shall conform to IEC or IEEE standards. The Contractor shall design and calculate the continuous current rating of the 22 kV cable system, given that the ambient temperature no less than 45 °C and the effect of solar heat shall be considered. The other parameters used in the design shall be practical, reasonable, operational and conform to IEC or IEEE standards. The calculated continuous current rating shall be shown in the single line diagram for station service system.
- 4.7 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 material according to IEC61914's definition. For composite material, the integral pad shall be 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. 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 shown in Figure 1.

For calculation of forces caused by short-circuit currents, the peak short circuit current shall be as given in the following table

System (kV)	The peak short circuit (kA)	Formation
22	62.5	Trefoil

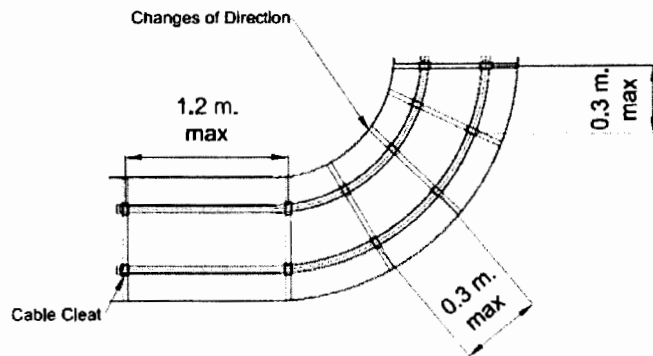


Figure 1: maximum span of cable cleats

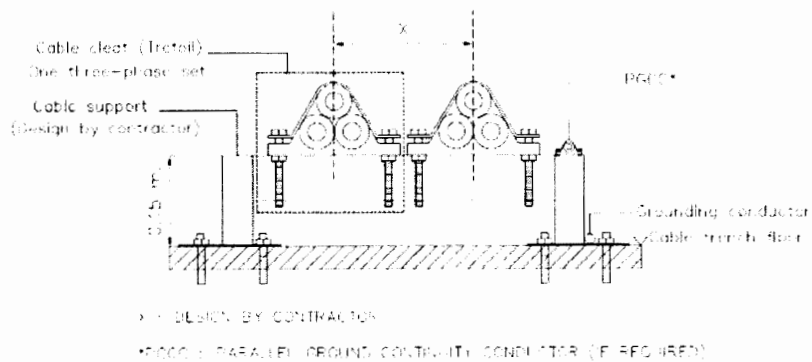


Figure 2: Trefoil Formation

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.

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.

4.8 The abnormal condition which occurs from the design and installation of 22 kV XLPE cable system, for example ferroresonance, etc., shall be responsible by the Contractor.

5. 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.

Grounding system

6. Design, supply and installation of the grounding system of the following:
 - 115 kV Conventional Substation
 - 22 kV system
 - Control building and 22 kV Switchgear building
7. The grounding conductor for the substation grounding system shall be of the 4/0 AWG bare copper wire type.
8. Design, supply and installation of the grounding equipment and miscellaneous hardware for the 115 kV Substation and the 22 kV system.
9. The contractor shall evaluate the price of ground grid for the additional area and the modified existing ground grid based on the specified design for price reference as below:
 - 9.1 The maximum ground grid conductor spacing (D_0) shall be 5 meters.
 - 9.2 The number of ground rod shall be 200 pieces.
10. The ground grid conductors spacing under the building area shall be the same as the Switchyard.
11. The Contractor shall conduct the soil resistivity measurement. The result shall be submitted to EGAT for approval.
12. 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 area for calculation shall be the additional area including with the area of the existing substation. The parameters for grounding system calculation shall be used as follows;
 - The symmetrical fault current (rms) = 31.5 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.

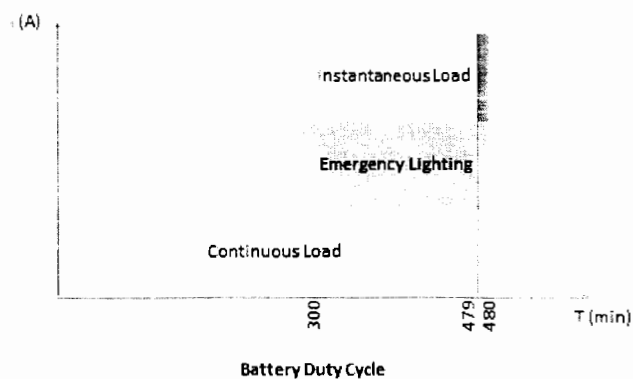
13. The contractor shall connect the grounding grid between the additional area and the existing area.
14. Modification to the existing grounding system in order that the maximum ground conductor spacing shall be 5 meters. The existing grounding system is shown in DWG. No. UD2-S-5-01/01 for information.
15. Design, supply and installation of the grounding system of the isolating transformer. The grounding system of the isolating transformer shall be separated from that of the substation.
16. The measurement of ground resistance at 115 kV substation shall be performed by the Contractor after completion of grounding system installation. Before the measurement, the overhead ground wire shall be disconnected from substation. The method of measurement shall follow the IEEE Std 81-2012, "IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System" or the latest versions. The result then shall be submitted to EGAT.

Lightning protection system

17. Design, supply and installation of the substation lightning protection system complete with all related equipment. The Contractor shall design the lightning protection system for the protection of all substation equipment which is under the protective zone. To meet EGAT's design criteria for the lightning protection system and to enhance the stability of lightning protection system, the Basic Insulation Level voltage (BIL) of
 - 550 kV for 115 kV Substation shall be used for the calculation instead of Critical Flashover voltage (CFO).
 - For 22 kV Substation, the stroke current of 2 kA shall be used for the calculation.
18. For the design of lightning protection system for the 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.
19. Lightning protection system shall be designed to meet IEC, NEMA and E.I.T. standards or internationally-accepted standards.

Station service system

20. Design, supply and installation of the station service system complete with integral accessories to provide the complete system operation. The station service system shall mainly consist of as follows:
- 250 kVA, 22,000-400/230V distribution transformer (KW1A)
 - 250 kVA, 22,000-400/230V distribution transformer (KW2A)
 - Automatic transfer switch (ATS)
 - 22 kV drop-out fuses
 - 600 V, 400 A safety switches
 - 22 kV equipment, AC&DC distribution boards, stationary batteries, battery chargers, power cables and all related equipment for the complete operation.
21. Design, supply and installation of equipment required for a complete 400/230 V power supply system.
22. 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 drawings. The calculation shall be submitted to EGAT for approval. The capacity of stationary battery is not less than 200 Ah.



23. Emergency lighting system shall be installed at the Control building and Switchgear 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.

Telecommunication system

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

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, one (1) lighting relay panel (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 the main entrance gate. Moreover, 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, fire alarm and protection system, air conditioning system, ventilation system and telephone & LAN system in the Control Building and 22 kV Switchgear Building. All cable wiring systems shall conform to 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 from safety switch to AC board to be less than 2% and from safety switch to load point to be less than 5% at rated load current.

Testing and commissioning

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

Other work

29. Removal and packing of equipment that shown in Dwg. No. UD2-S-1 (01/03), UD2-S-1 (02/03), UD2-S-7 (01/02) and UD2-S-7 (02/02) and delivery to EGAT store at Udon Thani 3 substation.

Address:

205, Moo 6, Udon Thani – Sakon Nakhon Road, Nong Na Kham Sub-district, Muang District, Udon Thani Province

(approximately 11 km. from Udon Thani 2 substation)

30. Modification to 22 kV bus support structure (BS202) for installation of the complete 22 kV underground cable system and disconnecting switches (2216 and 2226).
31. Modification to metering structure (MS3A and MS) for installation of the complete 22 kV underground cable system, disconnecting switches (2211 and 2221), power fuses (2291F(A) and 2291F(B)) and distribution transformers (KW1A and KW2A).
32. Modification to Junction box supporting structure (JB003) for the installation of outdoor receptacle box (ORB1 and ORB2).
33. Supply and installation of miscellaneous hardware required for suspension and station post insulator assembly.
34. Supply and installation of cable wiring from the marshalling control cubicle (MC002) to the associated equipment (KT1A, KT2A).

Control and Protection System

35. 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
 - Metering 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
 - Capacitor Bank control and protection panel
 - Outdoor GPS receiver system
 - GPS receiver Panel
 - 400/230 VAC 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.
36. Design, installation, wiring, test and commissioning of Remote Terminal Units (RTUs) and EGAT CCS/ RTU operator console which are supplied by EGAT, whereas configuration included in this contract must be fulfilled under EGAT's supervision.
37. 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.
38. Design, supply, installation, wiring, test and commissioning of Ethernet switch which connected between protection relays and EGAT's operation lan.
39. Design, supply, installation, wiring, test and commissioning of GPS receiver which is used as a reference time base to control and protection equipment.
40. Laying of optical fiber cable with accessories between EGAT-PEA Interfacing panel at 115 kV control building to joint box at 115 kV line to PEA take-off structure including field testing for optical fiber.
41. Relocation, design, wiring, test and commissioning of the 22 kV Capacitor Bank Control and Protection Cabinets to new 115 kV control building.

42. Any modification and interfacing works to the existing 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.
43. The Contractor shall be responsible for providing complete schematic and wiring diagrams of the control and protection systems.
44. 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

Architectural Work

45. Design and construction of
 - 45.1 115 kV Control Building with relay board.
 - 45.1.1 Structure & foundation. The proper structure can be selected for the design and construction and shall be submitted to EGAT for approval.
 - 45.1.2 RC and/or steel structure for roof.
 - 45.1.3 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
 - 45.1.4 Architecture of the whole building.
 - 45.1.5 The contractor shall construct the building in accordance with "IEEE STD- 979-1994 (R2004)" (IEEE Guide for Substation Fire Protection).
 - 45.1.6 115 kV Control Building with relay board shall be designed with reference to Dwg.No.SD-CD-0-02A. Equipment layouts shall conform to electrical drawing (Dwg.No.UD2-S-6). Other facilities layouts shall conform to requirements with reference to architectural drawings and scope of work.
 - 45.1.7 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.

45.1.8 The high flexible cementitious waterproofing coating material shall be applied to the working rooms to prevent moisture from the ground. Therefore, the floor remark section in the referenced drawings concerning installation areas of the said material shall be cancelled.

45.1.9 Building facilities

- Electricity and illumination system including cable work for illumination, ventilation system, power supply, air conditioning system, and telephone system.
- Plumbing system for water supply, building drain and vent, storm water drainage including sanitary wares and fittings.
- Miscellaneous including grounding and labeling.
- Cable routing and cable support (cable tray and cable ladder) installed in cable room and main cable trench.
- Access floor system (Raised flooring system) Panels shall be capable of supporting a uniform load or distributed load not less than 2,000 kg/sq.m.
- Floor panels shall consist of calcium sulphate. Protection against humidity, rotting and fire. Panels jig-milled to thickness size.
 - * Thickness : not less than 36 mm.
 - * Module : 600x600 mm.
- The understructure of pedestal should be module 600x600 mm. or 600x1200 mm. which provide better space for wiring and conduit.
- The understructure system of access floor such as pedestal profile steel beam, steel head plate and steel bolt shall be made of galvanized steel.
- Panel material shall be calcium sulphate and material shall be non-combustible, fire retardant, or the fire resistant building material class A2, with galvanized steel plate covering both on the top and bottom of the panel.
- Finished the surface of the floor panels with floor covering material indicated mineral panels with High Pressure Laminated(HPL)
- Cubicle shall be install on frame steel beam with are fixed to current system by bolting and shall be unwelded connection. No access floor underneath the cubicles.

- The system must provide future frame area which are fixed to the current system by bolting and adhesive shall be unwelded connection.
- Stringer frame and pedestal which allow for future repositioning are fixed to RC slab by bolting and adhesive shall be unwelded connection.
- Steel beam which support cubicles shall be at the same level of access floor panel.
- Weld are strictly not allow for this system.
- The access floor system, following standard : BS, DIN, ASTM
- With 10 years guarantee of material and installation.
- The Access Floor System material in the Specification No.3001 (Civil and Architectural work) and the referenced drawings of the said material shall be cancelled.
- Signboard on building and room name sign on each room.
- Warning sign provided in accordance with EIT Standard or Quality and Safety Development Division Standard (EGAT).
- The Furniture list shall be added as the follow details:
 - 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 item from the reference drawing not included in this contract.

46. Construction of

46.1 22/33 kV Switchgear Building.

- Fire protection for steel structure shall conform to legal provision, EGAT's specifications and Design manual for substation. Therefore, Fire protection specification in Architecture drawing shall be cancelled
- The high flexible cementitious waterproofing coating material shall be applied to the working rooms to prevent moisture from the ground. Therefore, the floor remark section in the referenced drawings concerning installation areas of the said material shall be cancelled.

Water Supply System

47. Design and construction of

47.1 Water Supply System

Civil Work

48. Design and construction of

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

48.1.1 115 kV Compact switchgear foundation

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

48.2 Road and drainage system.

48.3 Drainage system for cable trench.

48.4 XLPE Cable with cable cleat and RC cover.

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

49. Construction of

49.1 Telecommunication tower foundation.

49.2 22/33 kV. Switchgear building.

49.3 Steel support structure foundation.

49.4 Take-off foundation.

49.5 Equipment structure foundation with sub trench (if required).

49.6 Transformer loading.

49.7 Crushed rock surfacing.

49.8 Cable trench.

49.9 RC. Road.

49.10 Oil separator.

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

49.12 Wire mesh fence.

49.13 Removed and relocated existing wire mesh fence.

49.14 Main entrance gate 8.00 m width (sliding).

49.15 Signboard structure and foundation.

49.16 Site office.

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

49.18 Fire wall

49.19 Concrete pole strain bus structure(with guy)

50. The drawings and calculation of all buildings shall be verified with adequate details for intended application and submitted to EGAT for approval.
51. All design works and the fabrication drawings for all steel structures shall be submitted to EGAT for approval.
52. All design, construction and testing shall be in accordance with Specification No.3001 : Civil and Architectural Work.
53. 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.
54. All foundations shall be as specified in layout drawing. Except the result of soil investigation shows that the specified foundations are not appropriate, the Contractor shall design the proposed foundations.
55. The Contract price shall be adjusted (added or reduced) in case that the soil investigation results to be used for the design works is different from the layout and standard drawings.
56. Plate bearing test according to ASTM D1194-94 shall be submitted to EGAT for approval.(if pad type foundation is required).
57. The Contractor shall remove all debris from construction material and other works in order to make the site clean and be in the condition acceptable to EGAT.
58. According to the Contract Document Section G-3 : Contractor's Office and Other Construction Facilities; the detail in paragraph 3 shall be changed as follows : the Contractor shall provide for EGAT an office container at the site during construction with a minimum space of 36 sq.m for office area, 24 sq.m for conference room which shall both be air-conditioned and 4 sq.m for toilet. The facilities as shown on the section G-3 are required for 2 sets.

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Work not included in this Contract

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

1. The stringing work for the connection between the 115 kV substation take-off structures and the dead-end towers of the transmission lines.
2. Supply of station posts and suspension insulators.
3. Supply of Remote Terminal Units (RTUs), EGAT CCS/ RTU operator console and application software.

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2. UDON THANI 2 SUBSTATION (FIRE PROTECTION SYSTEM PHASE 3)
(JOB NO. FPS2-01-S19)

Schedule 2

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:

Civil and Architectural Work

Water Supply and Fire Protection System

1. Design and construction of

1.1 Fire protection system for 115 kV Control Building with relay board.

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

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

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

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

Zone 1: Equipment (Control/Relay) Room ;

Zone 2: Electrical Room ;

Zone 3: Under Raised Floor (If required);

Zone 4: Battery Room ;

Zone 5: Cable Room (If required) ;

Zone 6: Inert Gas Room

Other zone (If required)

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

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

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

i. Air Sampling Smoke Detector.

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

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

- NFPA 2001: Clean Agent Fire Extinguishing Systems.
- NFPA 70 : National Electrical Code.
- NFPA 72 : National Fire Alarm Code.
- NFPA 75 : Standard for the Fire Protection of Information Technology Equipment.
- NFPA76 : Standard for the Fire Protection of Telecommunications Facilities.
- EGAT's Standard Design Manual of Fire Protection and Suppression for Substation.(คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย)
- IEEE Std 979: IEEE Guide for Substation Fire Protection
- NFPA 850: Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Substations.

1.1.6 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.

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

1.2 Fire protection system for 22/33 kV Switchgear Building.

1.2.1 Switchgear Building shall consist of Total Flood Clean Agent Fire Suppression System with addressable type smoke detector and aspirated smoke detector.

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

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

1.2.4 For system requirements for indoor fire protection system as shown on specification 3001-10.13.1 part e, item 6 shall be changed to the new details as follow

- (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.

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

i. Air Sampling Smoke Detector.

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

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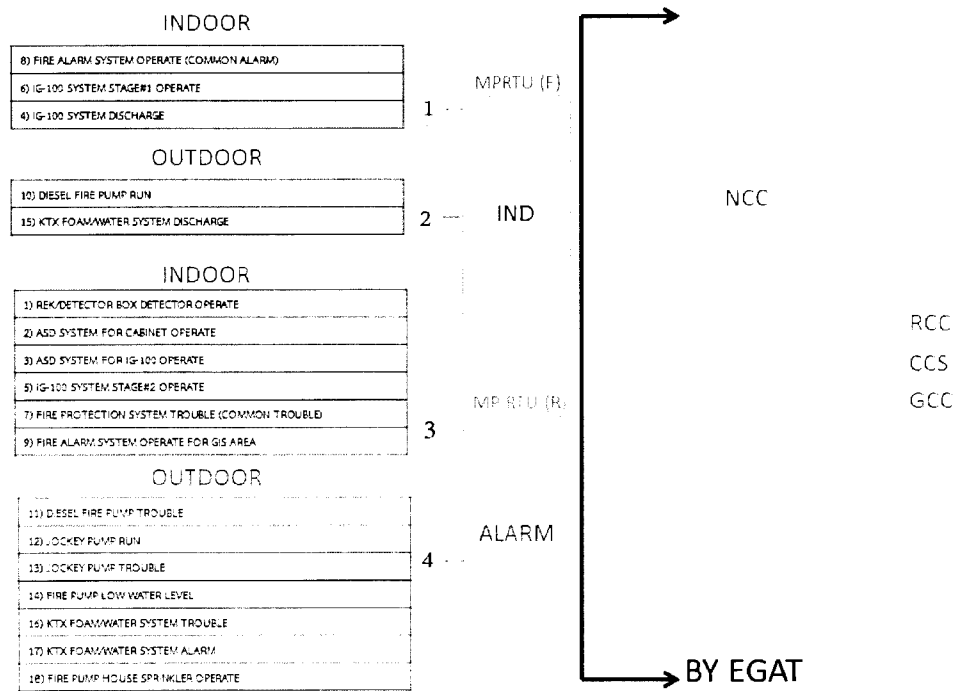
1.2.6 Fire protection system, fire alarm system, installation room and accessories shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:

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

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

- 1.3 Fire protection system for the switchyard to meet the requirement as specified in IEEE Guide for Substation Fire Protection: IEEE Std 979, all requirements of NFPA 850 and EGAT's Standard Design Manual of Fire Protection and Suppression for Substation (คู่มือมาตรฐานการออกแบบเพื่อป้องกันและระงับอัคคีภัยสถานีไฟฟ้าแรงสูงการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย).
- 1.4 ASD system for cabinets shall be able to alarm and address the source of smoke within 60 seconds and no later than transport time of ASD of each cabinet.
- 1.5 Fire Pump System. (conforming to NFPA 14, 20, 22, 24, 72).
- 1.6 250 cu.m water storage tank, fire pump, and jockey pump shall have trouble and operation visual and audible signals (environmental monitoring), which indicate change of state of any connected devices, shown and recorded at control room in 115 kV Control Building. The installation practice shall be in accordance with the latest edition of NFPA 72.

- 1.7 There shall be one fire alarm system graphic annunciator at each building to enable responding personnel to identify the location of a fire accurately and to indicate the status of emergency equipment or fire safety functions.
- 1.8 There shall be one graphic annunciator which displays alarm, discharge and trouble signals of fire alarm system of other buildings, (fire pump houses, transformers, shunt reactors) at the building where control room locates.
- 1.9 Fire protection system circuits for buildings and switchyards : notification appliance circuits , and signaling line circuits , shall be class A circuit. Initiating device circuits can be class B circuit.
- 1.10 Signals of indoor fire protection system of each room shall be sent to local CCS, GCC, RCC, and NCC as following details;



- 1.11 There shall be only one subcontractor engaging in design, supply and installation of Fire Protection System for Buildings and Switchyard.
- 1.12 All building wall openings for fire protection dampers shall be provided with stainless steel louvers and insect screens to install inside of building.

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

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

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

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

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

2. Construction of

2.1 Cabinets with 2x50 lbs wheel fire extinguisher.