

**1ST DRAFT OF TERM OF REFERENCE, ANNOUNCEMENT
AND DETAILS OF MEDIUM COST
FOR INVITATION TO BID NO. TILS-RX-01
SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER
SOUTHERN REGION TO ENHANCE SYSTEM SECURITY**

The Electricity Generating Authority of Thailand (EGAT) plans to call for proposals for the subject Bid. Any person who has the authorization from the company, firm, joint venture or consortium who supplies or manufactures the equipment required under the subject Bid is allowed to submit a comment against the first draft of the Term of Reference (TOR), the Announcement and the details of medium cost attached herewith.

How to Comment

Those who would like to comment shall submit an official letter signed by the authorized person together with the letter of authorization or the power of attorney, and addressed to “Chief, International Procurement Department – Transmission Segment, Procurement and Inventory Management Division”.

Comments shall be submitted via EGAT Procurement website or via email address: kulvadee.p@egat.co.th with all related documents attached (e.g. the letter of authorization and the power of attorney).

Comments shall be received by EGAT on or before **June 12, 2019**, otherwise the comments will not be taken into consideration:

EGAT reserves the right to change or not to change the terms and conditions contained in the Term of Reference, the Announcement and the details of medium cost subject to its consideration and such decision shall be final.

Sunisa Yaemyoo

Mrs. Sunisa Yaemyoo
Head, International Buy Section – Transmission System Segment
Date June 7, 2019



INVITATION TO BID NO. TILS-RX-01
SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT
IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

The Electricity Generating Authority of Thailand (EGAT) is calling for the subject Invitation to Bid to be financed by EGAT's fund.

Place of Delivery : Laem Chabang Port/ Ex-works

Medium Cost (including Value Added Tax and other expenses) : THB 204,000,000.-

Eligibility of Bidders

1. The Bidder shall be a juristic person who manufactures or provides such materials or 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 _____ to _____ 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 0241
E-mail : procurement.tse@egat.co.th

For more details and downloading Registration Form for purchasing Bidding Documents on website :

<http://www4.egat.co.th/fprocurement/biddingeng/>

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

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

Delivery of Bids

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

ELECTRICITY GENERATING AUTHORITY OF THAILAND

(Date of Announcement)

(Mrs. Nilanate Osotpavapusit)

Chief, International Procurement Department –
Transmission Segment

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ประกาศการไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เรื่อง ประกวดราคาซื้อ เลขที่ TILS-RX-01

การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย (กฟผ.) มีความประสงค์จะซื้อ 55 MVAR 500 kV Shunt Reactor สำหรับโครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคใต้ตอนล่าง เพื่อเสริมความมั่นคงระบบไฟฟ้า โดยใช้งบประมาณ กฟผ.

สถานที่ส่งมอบ : ท่าเรือแหลมฉบัง/ หน้าที่โรงงานผู้ผลิต

ราคากลาง(รวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ) : 204000000.- บาท

คุณสมบัติของผู้เสนอราคา

1. ต้องเป็นนิติบุคคลผู้ผลิตหรือเป็นผู้มีอาชีพขายพัสดุตามประกาศ และต้องไม่เป็นผู้ที่งานซึ่งสำนักนายกรัฐมนตรีได้แจ้งเวียนชื่อไว้หรือต้องไม่เป็นผู้ที่ กฟผ. ห้ามติดต่อหรือห้ามเข้าเสนอราคา หรือต้องไม่เป็นผู้ที่ได้รับผลของการสั่งให้นิติบุคคลหรือบุคคลอื่นเป็นผู้ทำงานตามคำสั่ง กฟผ.
2. ต้องไม่เป็นผู้มีผลประโยชน์ร่วมกันกับผู้เสนอราคารายอื่น ณ วันประกาศประกวดราคาครั้งนี้เป็นต้นไป หรือต้องไม่เป็นผู้กระทำการอันเป็นการขัดขวางการแข่งขันราคาอย่างเป็นธรรมในการดำเนินการประกวดราคาครั้งนี้
3. ต้องไม่เป็นที่ปรึกษาของ กฟผ. หรือมีส่วนร่วมในบริษัทที่ปรึกษาของ กฟผ. ในงานนี้ หรือต้องไม่มีผู้ปฏิบัติงาน กฟผ. เข้าไปมีส่วนร่วมในกิจการของผู้เสนอราคา ไม่ว่าจะในฐานะผู้ถือหุ้นที่มีสิทธิควบคุมการจัดการ กรรมการ ผู้อำนวยการ ผู้จัดการ พนักงาน ลูกจ้าง ตัวแทนหรือที่ปรึกษา ยกเว้น ในกรณีที่ผู้ปฏิบัติงานได้รับคำสั่งอย่างเป็นทางการจาก กฟผ. ให้ไปปฏิบัติงานหรือเข้าร่วมในกิจการของผู้เสนอราคา
4. ต้องไม่เป็นผู้ได้รับเอกสิทธิ์หรือความคุ้มกัน ซึ่งอาจปฏิเสธไม่ยอมขึ้นศาลไทย เว้นแต่รัฐบาลของผู้เสนอราคาได้มีคำสั่งให้สละสิทธิ์และความคุ้มกันเช่นนั้น
5. ผู้ประสงค์เข้าประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม (Joint Venture or Consortium) จะต้องดำเนินการทุกขั้นตอนของการประกวดราคาในนามของกิจการร่วมค้าหรือกิจการค้าร่วม ตั้งแต่การเสนอราคาจนถึงสิ้นสุดข้อผูกพันกับ กฟผ.

การขายเอกสารประกวดราคา

ผู้สนใจติดต่อขอทราบรายละเอียด เพื่อตรวจสอบคุณสมบัติของผู้เสนอราคา และขอซื้อเอกสารประกวดราคา ในราคาชุดละ 5,000.- บาท ได้ที่ แผนกซื้อต่างประเทศสายงานระบบส่ง (ห้อง 1202/2 ชั้น 12 อาคาร ท.101) กองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง ฝ่ายจัดซื้อจัดจ้างและบริหารพัสดุ การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เชียงสะพานพระราม 7 จังหวัดนนทบุรี ในวันทำการระหว่างเวลา 08:00 น. ถึง 15:00 น. ตั้งแต่วันที่ _____ ถึงวันที่ _____ หรือสอบถามทางโทรศัพท์ หมายเลข 0 2436 0241 หรืออีเมล procurement.tse@egat.co.th ทั้งนี้ สามารถ download แบบฟอร์มลงทะเบียนผู้ซื้อเอกสารประกวดราคาได้ที่เว็บไซต์ <http://www4.egat.co.th/fprocurement/biddingeng/>

การยื่นซองประกวดราคา

กำหนดยื่นซองประกวดราคา ในวันที่_____ เวลา 9:30 น. ถึง 10:00 น. และเปิดซองประกวดราคาเวลา 10:00 น. ณ ห้อง 1202/1 ชั้น 12 อาคาร ท.101 การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย เซิงสะพานพระราม 7 จังหวัดนนทบุรี

ประกาศ ณ วันที่

(นางนิลเนตร โอสถภาณุชิต)

หัวหน้ากองจัดซื้อจัดจ้างต่างประเทศสายงานระบบส่ง

DRAFT

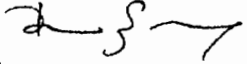
**ตารางแสดงวงเงินงบประมาณที่ได้รับจัดสรรและราคากลาง(ราคาอ้างอิง)
ในการจัดซื้อจัดจ้างที่มีใช้งานก่อสร้าง**

1. **ชื่อโครงการ** ประกวตราค่าเลขที่ TILS-RX-01
งานจัดซื้อ 55 MVAR 500 kV Shunt Reactor
โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคใต้ตอนล่าง เพื่อเสริมความมั่นคงระบบไฟฟ้า
/หน่วยงานเจ้าของโครงการ ฝ่ายแผนงานและโครงการระบบส่ง การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย
2. **วงเงินงบประมาณที่ได้รับจัดสรร**
โครงการปรับปรุงระบบส่งไฟฟ้าบริเวณภาคใต้ตอนล่าง เพื่อเสริมความมั่นคงระบบไฟฟ้า
งบประมาณ 35,400 ล้านบาท
3. **วันที่กำหนดราคากลาง** 15 พฤษภาคม 2562 (วันที่ ชสพ. อนุมัติ)
ราคารวมภาษีมูลค่าเพิ่มและค่าใช้จ่ายอื่นๆ เป็นเงิน 204,000,000.00 บาท ราคา/หน่วย ตามเอกสารแนบ
4. **แหล่งที่มาของราคากลาง**
หลักเกณฑ์การกำหนดราคากลางการจัดซื้อและจัดจ้างงานก่อสร้างระบบส่งไฟฟ้าของสายงานระบบส่ง
5. **รายชื่อเจ้าหน้าที่ผู้กำหนดราคากลาง**
 - 5.1 นายฉัตรชัย เขาวนาธิคม หมพ-ส. กวอ-ส.
 - 5.2 นางสาวกาญจนา ผลสวัสดิ์ วศ.5 หมพ-ส. กวอ-ส.

หมายเหตุ ค่าใช้จ่ายอื่นๆ ได้แก่ ค่าใช้จ่ายที่ กฟผ. ต้องจ่ายตามวิธีการพิจารณาเปรียบเทียบราคาที่กำหนดไว้ในเอกสารประกวดราคา เช่น อกรขาเข้า เป็นต้น

MEDIUM COST FOR BID NO.TILS-RX-01
SUMMARY OF BID PRICE
SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

No.	Description	Currency	Supply of Equipment	Foreign Currency
			Foreign Supply	
			CFR Thai Port	
			Amount	Amount
1	Schedule 1 : 500 kV Shunt Reactors	THB	184,061,500.00	2,336,000.00
BID PRICE		THB	184,061,500.00	2,336,000.00
IMPORT DUTY (0% and 10%)		THB	2,796,950.00	
CUSTOM CLEARANCE (0.6%)		THB	1,104,369.00	14,016.00
VAT		THB	13,080,091.50	163,520.00
SUMMARY OF BID PRICE		THB	201,042,910.50	2,513,536.00
TOTAL MEDIUM COST		THB	203,556,446.50	
TOTAL MEDIUM COST (ROUNDED)		THB	204,000,000.00	


 (นางสาวพราวฤกษ์ สุทธิกุล)
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MEDIUM COST FOR BID NO.TILS-RX-01

Schedule 1 : 500 kV Shunt Reactors

SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR

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

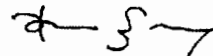
Item No.	Description	Qty.	Unit	Currency	Supply of Equipment		Foreign Currency
					Foreign Supply	CFR Thai Port	
					Amount	Amount	
1-1	Complete set of Reactor where one complete set comprises of one unit of 55 MVAR, 525 kV, three phases shunt reactor and one unit of 0.55 MVAR, 110 kV, 650 kV BIL, neutral reactor	4	lot	THB	181,000,000.00		XXXXXX
1-2	Spare parts for Item No. 1-1	lot		THB	3,061,500.00		XXXXXX XXXXXX XXXXXX XXXXXX
1-3	Cost of installation supervisor for Item No. 1-1	4	Man-Day	THB	XXXXXX		2,336,000.00
Total Price for Schedule 1				THB	184,061,500.00		2,336,000.00

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(นางสาวพนา ฤกษ์กุล)
อ.ส.

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MEDIUM COST FOR BID NO.TILS-RX-01**Breakdown Price of Item No. 1-1****SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR****TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY**

Item No.	Description	Currency	Supply of Equipment		
			Foreign Supply		
			FOB Vessel	Cost of Transportation to Thai Port	CFR Thai Port
			Unit Price	Unit Price	Unit Price
1-1.1a	Unit price of 55 MVAR, 525 kV, three phases shunt reactor complete with accessories as per Ratings and Features RF RX9411	THB	35,100,000.00		35,100,000.00
1-1.1b	Price of Insulating Oil for using in one (1) unit of reactor under Item No. 1-1.1a	THB	3,900,000.00		3,900,000.00
1-1.2a	Unit price of 0.55 MVAR, 110 kV, 650 kV BIL, neutral reactor to connect with shunt reactor complete with tank mounted surge arrester and accessories as per Ratings and Features RF RX7712	THB	5,625,000.00		5,625,000.00
1-1.2b	Price of Insulating Oil for using in one (1) unit of reactor under Item No. 1-1.2a	THB	625,000.00		625,000.00


 (นางสาวพนา สุภาวดี)
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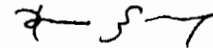
MEDIUM COST FOR BID NO.TILS-RX-01

Breakdown Price of Item No. 1-2

SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR

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

Item No.	Description	Qty.	Unit	Currency	Supply of Equipment			
					Foreign Supply			
					FOB Vessel	Cost of Transportation to Thai Port	CFR Thai Port	
					Unit Price	Unit Price	Unit Price	Amount
1-2.1a	1550 kV BIL, HV Bushing For Item No. 1-1.1a	1		THB	1,810,000.00		1,810,000.00	1,810,000.00
1-2.1b	650 kV BIL, Neutral Bushing For Item No. 1-1.1a	1		THB	447,000.00		447,000.00	447,000.00
1-2.1c	650 kV BIL, HV Bushing For Item No. 1-1.2a	1		THB	447,000.00		447,000.00	447,000.00
1-2.1d	110 kV BIL, Neutral Bushing For Item No. 1-1.2a	1		THB	15,500.00		15,500.00	15,500.00
1-2.2	120 kV Surge Arrester as per Ratings and Features RF SA7D01 For Item No. 1-1.2a	1		THB	92,000.00		92,000.00	92,000.00
1-2.3a	Complete Set of one or two units of each type and each size of auxiliary relay and contactor (two units are required where five units or more of each type and each size are provided per one reactor) For Item No. 1-1.1a	2		THB	63,500.00		63,500.00	127,000.00
1-2.3b	Complete Set of one or two units of each type and each size of auxiliary relay and contactor (two units are required where five units or more of each type and each size are provided per one reactor) For Item No. 1-1.2a	2		THB	61,500.00		61,500.00	123,000.00
Total Breakdown Price of Item No. 1-2				THB				3,061,500.00

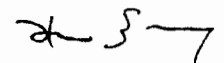

 (นางสาวพภาพร สุภานุภักดิ์)
 อวส.
 15 พ.ย. 62

MEDIUM COST FOR BID NO.TILS-RX-01
Service of Installation Supervisor (Schedule 1)
SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR

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

Item No.	Description	Qty.	Unit	Currency	Foreign Currency	
					Unit Price	Amount
1-3	Cost of installation supervisor for Item No. 1-1	4	Man-Day	THB	584,000.00	2,336,000.00

- Note:
1. The quoted total man-days for installation supervisor shall be the required number of days for complete installation, erection, field test and commissioning of all equipment as specified.
 2. In addition to the quoted total man-days above, EGAT will also pay the following :
 - a. Travelling time from and to Supervisor's home office as well as travelling time from and to the installation site including ten (10) working days of operation, if any, which will be at the same rate as the cost quoted per man-day.
 - b. Airfares round trip economy class between the Supervisor 's home office and Bangkok by the most expeditious and direct route.
 3. Local transportation from and to installation site will be provided by EGAT.
 4. If the working man-days are less than the quoted total man-days, the payment shall be on the basis of actual man-days.
 5. For man-days exceeding the quoted total amount, no payment shall be made by EGAT. Any such additional man-days approved by EGAT shall be paid on the quoted man-days rate.


 (นายสารพจน์ สุทธิกุล)
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 15 พ.ย. ๖2

Contract No.

Invitation to Bid No. TILS-RX-01

ELECTRICITY GENERATING AUTHORITY OF THAILAND



BIDDING DOCUMENTS

SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR

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

EGAT'S FUND

BIDDER : _____

(2019)

INVITATION TO BID NO. TILS-RX-01
SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT
IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY
EGAT'S FUND

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CONFIRMATION FORM

(INDIVIDUAL COMPANY / JOINT VENTURE)

INVITATION TO BID NO. TILS-RX-01

SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR

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

By signing in the space provided below, we confirm that:-

- According to “Eligibility of Bidders” and in addition to the Documentary List attached to the bidding documents, we are not a Jointly Interested Bidder with the other bidders as from the date of EGAT’s issuance of the subject Invitation and are not a person who undertakes any actions as an “Obstruction of Fair Price Competition”.
- According to Article B-8 Information to be Submitted with Bid, we confirm
 - Registration with the Revenue Department as a value added tax registrant in Thailand as per certificate of value added tax registration (พ.ร.บ.20) attached.
 - Non-Registration as a value added tax registrant in Thailand, but will register later.
 - Non-Registration as a value added tax registrant in Thailand and will not register.

Confirmed :

.....

By :

Title :

Date :

CONFIRMATION FORM

(CONSORTIUM)

INVITATION TO BID NO. TILS-RX-01

SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR

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

Member No. ... of the consortium:

By signing in the space provided below, we confirm that:-

- According to “Eligibility of Bidders” and in addition to the Documentary List attached to the bidding documents, we are not a Jointly Interested Bidder with the other bidders as from the date of EGAT’s issuance of the subject Invitation and are not a person who undertakes any actions as an “Obstruction of Fair Price Competition”.
- According to Article B-8 Information to be Submitted with Bid, we confirm
 - Registration with the Revenue Department as a value added tax registrant in Thailand as per certificate of value added tax registration (ทพ.20) attached.
 - Non-Registration as a value added tax registrant in Thailand, but will register later.
 - Non-Registration as a value added tax registrant in Thailand and will not register.

Confirmed :

.....

By :

Title :

Date :

DISCOUNT FORM

INVITATION TO BID NO. TILS-RX-01

SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR

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

Bidder : _____

By signing in the space provided below, we confirm that:-

- we offer no discount.
- we offer discount(s) as follows:

Details of discount	Currency	Amount	VAT
			<input type="checkbox"/> included <input type="checkbox"/> excluded
			<input type="checkbox"/> included <input type="checkbox"/> excluded
			<input type="checkbox"/> included <input type="checkbox"/> excluded
			<input type="checkbox"/> included <input type="checkbox"/> excluded

Remarks :

- The above discount(s) shall not be subject to any conditions. Discount with conditions shall not be considered.
- This Discount Form, together with Bidder's Summary of Bid Price, will be publicly presented on a screen to all Bidders in the bid opening room at the time of bid opening.

Confirmed by authorized person(s):

.....

By :

Title :

Date :

Additional Regulation

This Regulation shall apply to the Enquiry, Bid for Supply, Lease, Hire of Work, or Hire of Consultant by Way of Selection.

1. Attachments

1.1 Definitions

1.1.1 Jointly Interested Bidder

1.1.2 Obstruction of Fair Price Competition

1.2 Documentary List

2. Bidder's Qualifications

2.1 The Bidder shall professionally be in the business of providing materials or services or leasing or consultancy services, as the case may be, and shall not be named in the list of work abandoners published by the Office of the Prime Minister, and/or in the debarment list and/or the list of work abandoners declared by EGAT according to Article 5 of this Regulation.

2.2 The Bidder shall not be a Jointly Interested Bidder with other bidders as from the date of EGAT's issuance of the Invitation for Bid/Enquiry or the Invitation Letter/ Terms of Reference for the consultancy services, as the case may be, or shall not be a person who undertakes any action as an "Obstruction of Fair Price Competition" described in Article 1.1 - Definitions.

2.3 The Bidder shall not have EGAT's personnel involve 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.

3. Information to be Submitted with Bid

The Bidder shall submit with his bid the documents according to Article 1.2 - Documentary List, including but not limited to, the following documents :-

3.1 Where the Bidder is a juristic person :

(a) ordinary partnership or limited partnership

a certified copy of affidavit of incorporation, name list of managing partners, list of persons entrusted with controlling power (if any), as well as a certified copy of registration for value added tax (if any).

(b) limited company or public limited company

a certified copy of affidavit of incorporation, memorandum of association, name list of managing directors, list of persons entrusted with controlling power (if any) and name list of major shareholders, as well as a certified copy of registration for value added tax (if any).

Such certified copy of affidavit of incorporation with the validity of not more than six (6) months from the date of certification to the opening date of Bid/Enquiry or the date of Invitation Letter/Terms of Reference in case of consultancy services, as the case may be, shall certify at least the following information :

- (i) Type of a juristic person : an ordinary partnership, a limited partnership, a limited company, a public limited company,
- (ii) Name according to (i),
- (iii) Number and names of managing partners or managing directors,
- (iv) Number and names of managing partners or managing directors authorized to act on behalf of the company,
- (v) Amount of shareholders' equity or registered capital,
- (vi) Authority of managing partner in case of partnership,
- (vii) Location of head office,
- (viii) Registration purposes,
- (ix) Scope of work indicated in business permit license of a foreign juristic person who registers in Thailand,
- (x) Other documents e.g. changes or additions to the above documents, branches (if any).

3.2 Where the Bidder is a natural person or a group of persons other than a juristic person :

a certified copy of :

- identity card
- partnership agreement or contract (if any)
- partners' identity cards
- registration required by Ministry of Commerce of Thailand
- registration for value added tax (if any)

3.3 Where the Bidder is a joint venture / consortium :

a certified copy of :

- association agreement
- identity card or passport (if non Thai national)
(The participant in the joint venture or consortium is not a juristic person.)
- all documents specified in *Item 3.1* of Additional Regulation
(The participant in the joint venture or consortium is a juristic person.)

3.4 Other documentary evidence as required per *Item 3, 6 or 8* of Documentary List (if any).

4. Preliminary Examination

4.1 EGAT shall examine the qualification of all bidders to determine whether any bidder is a Jointly Interested Bidder as from the date of EGAT's issuance of the Invitation for Bid/Enquiry or the Invitation Letter/Terms of Reference for the consultancy services, as the case may be, and/or undertakes any action as an "Obstruction of Fair Price Competition" before or during the bid opening. If there is evidence showing that any bidder is a Jointly Interested Bidder or undertakes any action as an "Obstruction of Fair Price Competition", EGAT shall delete his name from the list of bidders and inform such bidder by written notice hereof.

4.2 The Bidder whose name is deleted according to Article 4.1, may, within *fifteen (15)* calendar days from the date of receipt of EGAT's written notice, appeal to EGAT, explaining reasons together with relevant documents for EGAT's reconsideration.

In case EGAT agrees with the objection of the appellant but considers that the cancellation of enquiry/bidding will be beneficial to EGAT, EGAT may, at its sole discretion, cancel such bid. In the event that the Bidder who undertakes any action as an "Obstruction of Fair Price Competition" does not appeal or, after his appeal, EGAT does not agree with his objection, such Bidder shall be regarded as a work abandoner.

EGAT's decision shall be notified to the appellant in writing and such decision shall be final and conclusive.

5. Reservation of the Right for Proposal and Others

In case any juristic person is regarded as a work abandoner by EGAT and such abandonment is caused by the manager, the managing partner, the managing director, the executive or the person authorized to manage the business of that juristic person, EGAT shall also include his name as a work abandoner.

In case any juristic person is regarded as a work abandoner by EGAT, such decision shall also be applied to other juristic persons of the same business where its manager, managing partner, managing director, executive, or person authorized to manage the business is the same person who is the manager, managing partner, managing director, executive, or person authorized to manage the business of the juristic person who is regarded as a work abandoner by EGAT as aforesaid.

In case any natural person is regarded as a work abandoner by EGAT, such decision shall also be applied to other juristic persons who submit the proposal and have such natural person as the manager, managing partner, managing director, executive or person authorized to manage the business of such juristic persons

1.1 Definitions

These definitions shall apply to the Enquiry, Bid for Supply, Lease, Hire or Work, or Hire of Consultant by Way of Selection.

1.1.1 “**Jointly Interested Bidder**” means a natural person or juristic person who submits bid to EGAT for the supply of goods, lease, hire of work, or hire of consultant by way of selection, as the case may be, and who has an interest, either directly or indirectly, in the business of another natural person or juristic person whose bid is also submitted to EGAT in this bidding.

The interest, either direct or indirect, in another natural person or juristic person as aforesaid includes the relationship in the following manners :

- (1) Management relationship, whereby the manager, the managing partner, the managing director, the executive or the person authorized to manage the business of a natural person or a juristic person has the power, or is able to exercise the power, in managing the business of the other one or more natural persons or juristic persons whose bids are also submitted to EGAT in this bidding.
- (2) Capital relationship, whereby a partner in an ordinary partnership or a partner with unlimited liability in a limited partnership or a major shareholder in a limited company or a public limited company is a partner in the other one or more ordinary partnerships or limited partnerships, or is a major shareholder in the other one or more limited companies or public limited companies whose bids are also submitted to EGAT in this bidding.
- (3) Cross relationship between (1) and (2), whereby the manager, managing partner, managing director, executive or person authorized to manage the business of a natural person or juristic person is a partner in the other one or more ordinary partnerships or limited partnerships, or is major shareholder in the other one or more limited companies or public limited companies whose bids are also submitted to EGAT in this bidding, or *vice versa*.

“**Major shareholder**” means a shareholder who holds more than twenty five (25) percent of stake in such an enterprise or at another percentage determined by the Governor as he deems expedient for some types or sizes of enterprises.

Holding of position, being a partner or shareholding as aforesaid by the spouse or minor of the person in (1), (2) or (3) shall be deemed the holding of position, being a partner or shareholding by such person.

If any bidder uses the name of another person as the manager, managing partner, managing director, executive, partner or shareholder, but in which case he himself in fact exercises the power in management or he himself is the real partner or shareholder of the partnership or limited company or public limited company, as the case may be, and the related partnership or limited company or public limited company whose bid is also submitted to EGAT in this bidding, that bidder shall be deemed to have a relationship under (1), (2) or (3), as the case may be.

1.1.2 ***“Obstruction of Fair Price Competition”*** means any act committed by a bidder or bidders causing hindrance or obstruction or impeding the opportunity for fair price competition in the tendering of bid to EGAT, whether done by collusion, or by granting, requesting, or agreeing to grant, demand, accept or agreeing to accept money or property or other benefit or by committing an act of violence or by threatening to commit an act of violence or presenting a false document or doing any act in bad faith, with the objective of acquiring benefit among the other bidders or in order to give benefit to any specific bidder so that such person will be entitled to enter into a contract with EGAT or in order to avoid fair price competition, or in order to take advantage of EGAT which not being usual business practices.

DRAFT

1.2 Documentary List

This documentary list shall apply to the Enquiry, Bid for Supply, Lease, Hire of Work, or Hire of Consultant by Way of Selection.

	No. of page(s)	For EGAT only	
<u>Thai National Bidder</u>			
[] 1. Where the Bidder is a natural person or a group of persons other than a juristic person			
() (a) Natural Person		Yes	No
- Certified copy of identity card		<input type="checkbox"/>	<input type="checkbox"/>
() (b) Group of persons			
- Certified copy of partnership agreement or contract (if any)		<input type="checkbox"/>	<input type="checkbox"/>
- Certified copy of identity card(s) of partners or related documents according to <i>Item 2 (a) and (b)</i> of each participant of the group		<input type="checkbox"/>	<input type="checkbox"/>
[] 2. Where the Bidder is a juristic person			
() (a) Ordinary partnership or limited partnership			
- Certified copy of affidavit of incorporation		<input type="checkbox"/>	<input type="checkbox"/>
- Name list of managing partners and list of persons entrusted with controlling power (if any)		<input type="checkbox"/>	<input type="checkbox"/>
(Please fill in the form on page 10.)			
() (b) Limited company or public limited company			
- Certified copy of affidavit of incorporation		<input type="checkbox"/>	<input type="checkbox"/>
- Memorandum of Association		<input type="checkbox"/>	<input type="checkbox"/>
- Name list of managing directors and list of persons entrusted with controlling power (if any)		<input type="checkbox"/>	<input type="checkbox"/>
(Please fill in the form on page 10.)			
- Name list of major shareholders		<input type="checkbox"/>	<input type="checkbox"/>
(Please fill in the form on page 11.)			
[] 3. Other documents (if any)			
() Certified copy of any other registration required by Ministry of Commerce of Thailand		<input type="checkbox"/>	<input type="checkbox"/>
() Certified copy of registration for value added tax		<input type="checkbox"/>	<input type="checkbox"/>
()		<input type="checkbox"/>	<input type="checkbox"/>
()		<input type="checkbox"/>	<input type="checkbox"/>
()		<input type="checkbox"/>	<input type="checkbox"/>

h

Non-Thai National Bidder

<p>[] 4. Where the Bidder is a natural person or a group of persons other than a juristic person</p> <p>() (a) Natural Person</p> <p style="padding-left: 20px;">- Certified copy of passport</p> <p>() (b) Group of persons</p> <p style="padding-left: 20px;">- Certified copy of partnership agreement or contract (if any)</p> <p style="padding-left: 20px;">- Certified copy of passport of partners or related documents according to <i>Item 5</i> of each participant of the group</p> <p>[] 5. Where the Bidder is a juristic person</p> <p style="padding-left: 20px;">- Certified copy of affidavit of incorporation</p> <p style="padding-left: 20px;">- Name list of managing partners, directors, etc., as the case may be, and list of persons entrusted with controlling power (if any)</p> <p style="padding-left: 20px;">- Memorandum of Association (if any) (Please fill in the form on page 10.)</p> <p style="padding-left: 20px;">- Name list of major shareholders (if any) (Please fill in the form on page 11.)</p> <p>[] 6. Other documents (if any)</p> <p>()</p> <p>()</p> <p>()</p> <p>()</p> <p>()</p>	<table border="0"> <thead> <tr> <th style="text-align: left;">Yes</th> <th style="text-align: left;">No</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>	Yes	No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Thai and Non-Thai National Bidder

	No. of page(s)	For EGAT only	
		Yes	No
[] 7. Where the Bidder is a joint venture / consortium			
- Certified copy of association agreement	<input type="checkbox"/>	<input type="checkbox"/>
() (a) If participant of a joint venture / consortium is not a juristic person			
(i) Thai national			
- Certified copy of identity card	<input type="checkbox"/>	<input type="checkbox"/>
(ii) Non-Thai national			
- Certified copy of passport	<input type="checkbox"/>	<input type="checkbox"/>
() (b) If participant of a joint venture / consortium is a Thai-national juristic person			
() (i) Ordinary partnership or limited partnership			
- Certified copy of affidavit of incorporation	<input checked="" type="checkbox"/>	<input type="checkbox"/>
- Name list of managing partners, and list of persons entrusted with controlling power (if any) (Please fill in the form on page 10.)	<input type="checkbox"/>	<input type="checkbox"/>
() (ii) Limited company or public limited company			
- Certified copy of affidavit of incorporation	<input type="checkbox"/>	<input type="checkbox"/>
- Memorandum of Association	<input type="checkbox"/>	<input type="checkbox"/>
- Name list of managing directors, and list of persons entrusted with controlling power (if any) (Please fill in the form on page 10.)	<input type="checkbox"/>	<input type="checkbox"/>
- Name list of major shareholders (Please fill in the form on page 11.)	<input type="checkbox"/>	<input type="checkbox"/>

	No. of page(s)	For EGAT only	
		Yes	No
() (c) If participant of a joint venture / consortium is a Non-Thai national juristic person			
- Certified copy of affidavit of incorporation		<input type="checkbox"/>	<input type="checkbox"/>
- Name list of managing partners, directors, etc., as the case may be, and list of persons entrusted with controlling power (if any) (Please fill in the form on page 10.)	<input type="checkbox"/>	<input type="checkbox"/>
- Memorandum of Association (if any)		<input type="checkbox"/>	<input type="checkbox"/>
- Name list of major shareholders (if any) (Please fill in the form on page 11.)	<input type="checkbox"/>	<input type="checkbox"/>
[] 8. Other documents (if any)			
() Certified copy of any other registration required by Ministry of Commerce of Thailand	<input type="checkbox"/>	<input type="checkbox"/>
() Certified copy of registration for value added tax in Thailand	<input checked="" type="checkbox"/>	<input type="checkbox"/>
()	<input type="checkbox"/>	<input type="checkbox"/>
()	<input type="checkbox"/>	<input type="checkbox"/>
()	<input type="checkbox"/>	<input type="checkbox"/>

We hereby confirm that all documents detailed above are true and correct.

Signed _____
(Name of Bidder)

stamp company seal (if any)

List of Names of Manager / Managing Partner / Managing Director / Executive /
 Person Who Is Authorized to Manage the Business
 (Relationship in Management)
Bidder shall fill in and submit this form with his bid

Enquiry / Bid No : Enquiry / Bid Opening Date :
 Name of Company / Partnership / Juristic Person :

No.	Name – Surname	Position	Name – Surname of Spouse	Name – Surname of Minor

We hereby confirm that all documents submitted are true and correct.

Signed _____
 (Name of Bidder)

Stamp company seal (if any)

Remarks

1. The unused wordings shall be struck out.
2. Duplicate this page as necessary.

List of Partner in Ordinary Partnership / Partner with Unlimited Liability in Limited Partnership /
Major Shareholder in Limited Company or Public Limited Company
(Relationship in Capital)

Bidder shall fill in and submit this form with his bid

Enquiry / Bid No. : Enquiry / Bid Opening Date :

Name of Company / Partnership / Juristic Person :

Registered Capital : (currency) Number of Share : Price per Share : (currency)

No.	Name - Surname	Position	Number of Share (%) or Amount of Shareholder's Equity	Name – Surname of Spouse	Number of Share (%) or Amount of Shareholder's Equity	Name – Surname of Minor	Number of Share (%) or Amount of Shareholder's Equity

We hereby confirm that all documents submitted are true and correct.

Signed _____

(Name of Bidder)

Stamp company seal (if any)

Remarks

1. The unused wordings shall be struck out.
2. "Major Shareholder" means a shareholder who holds more than twenty-five (25) per cent of stake in an enterprise. The shareholding of spouse or minor of a person shall be regarded as being the shareholding of such person. In case of no major shareholder, please specify "No major shareholder" in the tabulation above.
3. Duplicate this page as necessary.
4. The Bidder shall submit List of Names of Manager/ Managing Partner/ Managing Director/ Executive/ Person Who Is Authorized to Manage the Business (Relationship in Management)/ and List of Partner in Ordinary Partnership/ Partner with Unlimited Liability in Limited Partnership/ Major Shareholder in Limited Company or Public Limited Company (Relationship in Capital) of the Bidder as per page 10-11 of this Additional Regulation.

In case that any Major Shareholder(s) of the Bidder is (are) juristic person(s), and such juristic person(s) has (have) Major Shareholder(s) who is (are) juristic person(s), the Bidder shall submit the list of the Major Shareholder(s)/ the Names of Manager/ Managing Partner/ Managing Director/ Executive/ Person Who Is Authorized to Manage the Business/ Partner/ Partner with Unlimited Liability/ of such juristic person(s) as per page 10-11 of this Additional Regulation. The requirement of submission of list of the Major Shareholder(s)/ the Names of Manager/ Managing Partner/ Managing Director/ Executive/ Person Who Is Authorized to Manage the Business/ Partner/ Partner with Unlimited Liability/ of such juristic person(s) shall apply to 2 tiers of Major Shareholder(s) who is(are) juristic person(s).

Important Information
for
Invitation to Bid No. TILS-RX-01

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-8. 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-9. Liquidated Damages for Late Delivery of Equipment:

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

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DATA SHEET

DATA SHEET

for

Invitation to Bid No. TILS-RX-01

This section consists of provisions that are specific to each procurement and supplement the information or requirements included in bidding documents.

Article B-3. Bid Security

The amount of bid security shall be USD 321,740.- or THB 10,200,000.-.

Article B-4. Validity of Bids

The validity of the bid shall be for one hundred and twenty (120) Days from the date specified for opening of bid.

Article B-8. Information to be Submitted with Bid:

Item m. is not applicable

Article B-12. Evaluation and Comparison of Bids:

The evaluation of bid prices shall be on schedule basis.

Article E-29. Failure to Meet Requirements and F-10. Maintenance Guarantee

Maintenance Guarantee Period

- For all Equipment except Shunt Reactor, 200 MVA 230 kV and above Power Transformer and 500 kV System Voltage Equipment

The Contractor shall guarantee the proper functioning of Equipment 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
- <u>For Shunt Reactor, 200 MVA 230 kV and above Power Transformer and 500 kV System Voltage Equipment</u>	

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

Defective Equipment to be replaced with the whole new set

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

Article F-9. Liquidated Damages for Late Delivery of Equipment

The Liquidated Damages shall be at the rate of one-tenth of one (0.10) per cent of the price of Equipment not timely delivered for each Day of delay. This sum is payable regardless of the actual loss and/or damages incurred.

The payment as liquidated damages for late delivery of Spare Equipment shall be one-tenth of one (0.10) per cent of the price of each item of Spare Equipment not timely delivered for each Day of delay

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SECTION A
INVITATION TO BID

INVITATION TO BID NO. TILS-RX-01
SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT
IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

A-1. Invitation

The Electricity Generating Authority of Thailand (EGAT) hereby invites sealed bids for furnishing and delivering of 55 MVAR 500 kV Shunt Reactor under Transmission System Improvement Project in Lower Southern Region to Enhance System Security hereinafter called Equipment in accordance with the terms, conditions and Specifications described in these Bidding Documents.

A-2. 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 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*.

- c. The Bidder shall be well-established and maintain a permanent place of business. For a joint venture or consortium, all members of the joint venture or consortium are required to meet this qualification.
- d. The Bidder shall not be named in the List of Work Abandoners published by the Office of the Prime Minister and/or in the Debarment List and/or in the List of Work Abandoners declared by EGAT.

- e. For the Bidder who changes name before submitting the bid, his experience records in previous name shall be considered as the experience records of the Bidder.
- f. The Bidder shall not be a Jointly Interested Bidder with other Bidders as from the date of EGAT's issuance of this 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.
- g. The Bidder shall not either be EGAT's consultant or involve 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 the ones who are officially ordered by EGAT to act or participate therein.
- h. 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.
- i. In case of a joint venture or consortium, the Bidder shall carry out all the provision of the Equipment and all Work under such formation from the time of bidding until the fulfillment of the Contract and the parties to the joint venture or the consortium shall accept joint and several liability for performing all obligations under the bid and the Contract.
- j. The Bidder shall not propose to supply the Equipment from the country under the state of war whether declared or not.
- k. The Bidder shall have adequate fund to meet financial obligations incidental to this Contract.
- l. The Bidder shall submit documentary evidence established in accordance with Article B-8. Information to be Submitted with Bid to demonstrate the Bidder's sufficient eligibility to bid and qualification to perform the Contract.

A-3. Eligibility of Bidders: Technical Requirements

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

- a. The Bidder shall manufacture or supply the Equipment or Work as required under this invitation to bid.

- b. 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.
- c. The Bidder shall have no just or proper claims pending against the Bidder with respect to breach in the performance of contract on other similar works awarded by EGAT. If the 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.
- d. The Bidder shall have sufficient capacity to carry out the Work.
- e. The Bidder shall propose Equipment manufactured by the qualified manufacturers who shall fulfill the following requirements :
 1. Being well-established and maintaining a permanent place of business.
 2. 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.

3. 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 e.5 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.

4. Regularly manufacturing of Equipment of the type and ratings proposed.
5. Having minimum experience in manufacturing of the following reactors with the minimum BIL rating of winding of 1425 kV with at least five consecutive years of successful operation/use in overseas (not his own country). A combination of three-phase reactors and reactor banks can be considered.

5.1 Five units of three-phase reactor having the minimum capacity of 100 MVAR

OR

5.2 Five reactor banks (each bank comprises three single-phase reactors) with the minimum capacity of each bank not less than 100 MVAR

6. Proposing the manufacturer who has no just or proper pending claims against Equipment on other similar works.

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.

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

- a. Proposing the Equipment from the manufacturer having a certificate indicating that his system has been satisfactorily developed and implemented conforming to ISO 9001.

A-4. Joint Venture or Consortium

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

A-5. Preparation and Delivery of Bids

Bids shall be prepared in accordance with the Instructions to Bidders contained in the Bidding Documents in one (1) original and three (3) hard copies in English, on the bid forms included for this purpose and shall be accompanied with a bid security as required under the Article pertaining to Bid Security in Section B. Instructions to Bidders. The bid security will be placed in a separate sealed envelope.

The envelope of the bids will be marked in capital letters in the lower left-hand corner as follows :

INVITATION TO BID NO. TILS-RX-01

SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR

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

and shall be addressed and delivered to :

International Procurement Department - Transmission Segment
Procurement and Inventory Management Division
Electricity Generating Authority of Thailand
Bangkrui, Nonthaburi 11130
Thailand

on or before 10:00 a.m., Bangkok Standard Time,*see Tentative Schedule*.....

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

Bids will be opened publicly at Room No. 1202/1, 12th floor, Building TOR 101 and at the time specified above.

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

A-6. Availability of Bidding Documents

The Bidding Documents in CD-ROM are available for examination and can be obtained from EGAT at the hereunder address upon payment to EGAT, non-refundable, in the amount of USD 160.- or Baht 5,000.-. These prices include the value added tax.

International Procurement Department - Transmission Segment
Procurement and Inventory Management Division
Electricity Generating Authority of Thailand
Bangkrui, Nonthaburi 11130
Thailand

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SECTION B
INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

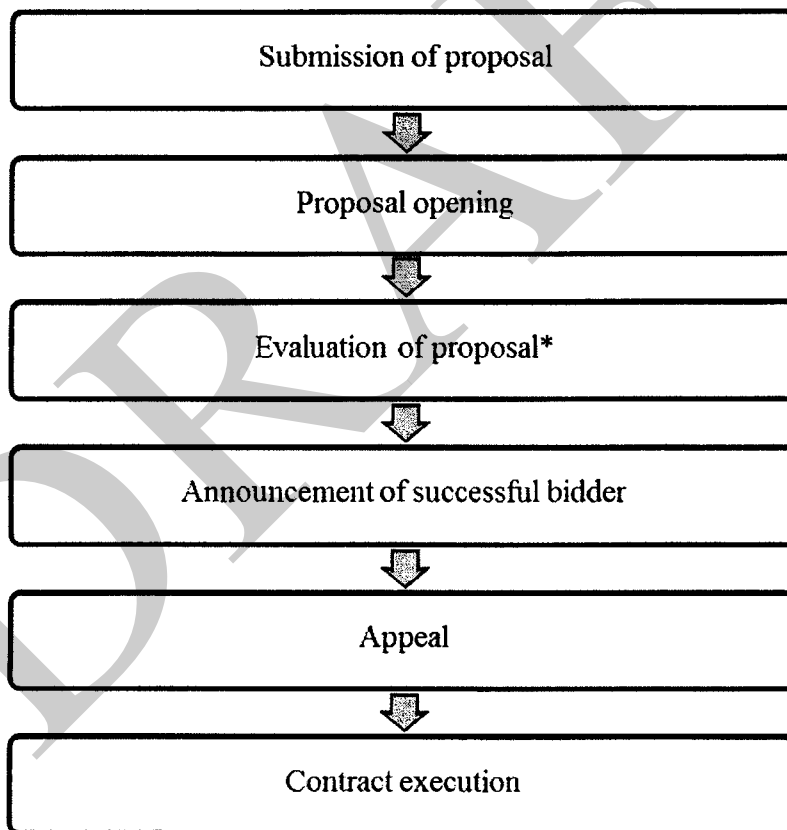
Overview of the Procurement Process

In compliance with the Office of the Prime Minister's Regulations of e-Government Procurement B.E.2549, bid prices and the Contract Price shall include value added tax (VAT) imposed under the law of Thailand. The medium cost announced by EGAT is inclusive of VAT and other relevant expenses.

The amounts of performance security, maintenance security, and liquidated damages shall also be based on the Contract Price which is inclusive of VAT (if any).

For evaluation and comparison of Bids, the bid price shall be evaluated according to the conditions specified in the bidding document.

The procurement process is summarized in the following diagram.



*Remarks

1. The Bidder shall be deemed to have carefully examined all of the terms, conditions and Specifications of the Bidding Documents.
2. EGAT will take into consideration the conformity of the bid to the requirements of the Bidding Documents as well as the suitability for the purpose intended.
3. EGAT will not be bound to accept the bid with the lowest indicated cost. EGAT reserves the right to accept the bid which in its judgement is the lowest evaluated bid.

B-1. Preparation of Bids

- a. Bids shall be prepared in English, in one (1) original and three (3) hard copies, clearly marked each "Original" and "Copy", and submitted at the place and time specified for receipt of bids.

In the event of any discrepancy between the Original and the Copy, the Original shall govern.

For price quotation, Bidder must fill bid prices in an excel file of Price Schedules contained in the Bidding Documents and submit one (1) original and three (3) hard copies together with the excel file to EGAT at the same time of bid submission.

Pursuant to the Office of the Prime Minister's Regulations of e-Government Procurement B.E.2549, VAT at the prevailing rate shall be filled automatically in the Summary of Bid Price of the price schedule in the Excel file subject to Article B-2. Bid Prices.

However, in case Bidder is a consortium formed of two or more companies, Bidder must also submit one (1) original hard copy including an excel file of price schedules of the Work performed by each member of the consortium in addition to hard copies and excel file of the total bid price as specified above.

If any discrepancy between the bid prices of the Work performed by each member of the consortium and the bid prices of the Bidder occurs, the bid prices of the Bidder shall govern and the bid prices of the Work performed by each member of the consortium shall be adjusted accordingly.

In the event of discrepancy between the original hard copy and the Excel file submitted, the original hard copy shall govern.

- b. Bidder shall not submit more than two (2) proposals and the proposal(s) to be submitted shall conform to the specifications. In case of any deviation from the specifications, Bidder shall follow the provisions under Article B-9. Deviations from Specifications.
- c. The "Original" and "Copy" shall be prepared on the bid forms included and made a part of the Bidding Documents, which shall be submitted with all applicable blanks in the bid forms properly filled in, and shall be manually signed in ink by a person or persons duly authorized. The letter of authorization shall be indicated by written power-of-attorney accompanying the bid.

All pages of the bid, except for unamended printed literature, shall be initialed by the person or persons signing the bid.

- d. The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such corrections shall be initialled by the person or persons signing the bid.
- e. Modification by letter or facsimile of bids already submitted will be considered if received prior to the time fixed for the receipt of bids. Confirmation by letter of any modification by facsimile should be sent to EGAT evidencing by post mark not later than the deadline for submission of Bids.
- f. No Bidder will be permitted to alter his bid after the bids have been opened, but clarifications not changing the substance of the bid therein may be accepted.
- g. Bidder may quote for any schedule or all schedules as called for, but shall quote for all items of the schedule(s) proposed. Consideration will be made as stipulated in Article B-12. Evaluation and Comparison of Bids.
- h. Any price discount to be offered shall be clearly stated in the Discount Form accompanied with the Bid to be submitted on the bid opening date specified herein.

B-2. Bid Prices

Currency

Bid prices as shown in Article C-1. Price Schedule shall be firm, not subject to adjustment and payable in the currencies as follows :

- a. The bid price shall be quoted in Thai baht, US dollar, euro, Japanese yen, renminbi (Chinese yuan), or in the Bidder's or Manufacturer's home currency only if his currency trading is prevailed at the time of bidding in any international market other than in Bidder's or Manufacturer's home country.

If the currencies quoted by the Bidder do not conform to the requirement set forth herein, EGAT reserves the right to convert the bid price to US dollars by using the exchange rate on the Reuters screen which is announced at 10.00 a.m. (Bangkok Time) on the bid opening date. Such converted bid price in US dollars shall be treated as the Bidder's proposed bid price. In such case the Contract Price for such portion under the Contract shall be made in US dollars.

Subject to paragraph a. above, in case the Bidder expects to incur a portion of its expenditures in the performance of the Contract in more than one currency and wishes to be paid accordingly, the bid price shall be expressed in different currencies and the respective amount in each currency together making up the total price.

- b. Local expenditures shall be quoted in Thai Baht.
- c. Payments will be made in the currency or currencies in which the bid prices have been stated.

Source of Supply and Service

- a. Prices for Equipment manufactured in Thailand shall be firm ex-works prices and quoted in Thai Baht. Any import duty and taxes (value added tax included) assessed by the Government of Thailand at the port of entry on imported raw materials or components shall be paid by the Contractor and included in these ex-works prices.
- b. Prices for Equipment manufactured outside Thailand (imported Equipment) shall be firm, stated both on FOB Port of Shipment/Vessel and CFR Thai Port basis, and quoted in foreign currencies specified above. Any import duty, excise tax (if any) and value added tax to be assessed by the Government of Thailand at the port of entry shall not be included in the quoted bid prices.
- c. Prices for services including cost of installation supervisor (if any) shall be firm.
- d. All expenses incurred for the Work specified in Article F-1. Scope of Work shall be included in the quoted Bid Prices.

Price Schedule

The Bidder shall enter a unit price, an amount, or a lump sum price, as required, for every item listed in the price schedule. If the unit price as entered does not conform to the amount entered for the same item, the unit price shall govern. If the sum of the amount entered for individual items does not conform to the total amount entered for these amounts under total bid prices, then the sum of the amount entered for the individual items shall govern.

Where quantity and total price only are required, the unit price shall be taken as the stated total price divided by the quantity specified.

Except for foreign supply, VAT at the prevailing rate shall be filled automatically in the Summary of Bid Price of the price schedule in the Excel file. However, the Contract Price shall include VAT only for the portion of Work which is subject to VAT.

B-3. Bid Security

The original of the bid submitted shall be accompanied with a bid security in the form of a cash deposit or a certified cheque issued by a local bank, *or a cashier cheque issued by a*

local bank, or a bank guarantee or a letter of guarantee issued only by a local bank or an acceptable financial institution in Thailand, or by a foreign bank counter-guaranteed by a local bank as primary obligor. *In case of a cash deposit, only Thai baht can be made.*

The bid security shall be in a form as per specimen attached or in any other form with essential content in accordance with the specimen, and made payable to EGAT in the amount as specified in Data Sheet. Any bid not being accompanied with bid security shall be rejected. The bid security shall remain in force up to and including ninety (90) Days after the expiry date of the bid validity.

The bid security shall be forfeited in favor of EGAT if :

- a. The Bidder withdraws his bid after the bid is opened; or
- b. The successful Bidder fails for any reason to execute the Contract or to furnish a performance security.

The Bidder may, upon EGAT's request to extend the bid security when it has expired, refuse to do so without forfeiting the bid security. A Bidder granting the request will be neither required nor permitted to modify his bids.

The bid security of unsuccessful Bidder(s) will be returned as decided by EGAT or within thirty (30) Days following EGAT's acceptance of the successful Bidder.

The bid security of the successful Bidder will be returned upon execution of the Contract and after the performance security furnished has been accepted by EGAT.

B-4. Validity of Bids

The validity of the bid shall be as specified in Data Sheet.

In the event EGAT requires the validity period to be extended, EGAT may in writing or by facsimile so notify the Bidders at least fourteen (14) Days prior to the expiry date of the validity period, in which event any Bidder not agreeing to such request for extension may withdraw his bid by so advising EGAT in writing or by facsimile prior to the expiry date of the original validity period. If the advice of withdrawal shall not have been received by EGAT prior to the said date, the extension shall be deemed to have been accepted by the Bidder, and the Bidder shall be required to extend the effective period of the bid security accordingly.

B-5. Delivery of Bids

Where bids are submitted by mail, the hour and date of receipt of the bid will be taken as that certified by EGAT. For all bids delivered directly, a receipt will be furnished to the Bidder indicating the place, hour, and date of delivery. Late bids will be returned unopened.

B-6. Withdrawal of Bids

Bids may be withdrawn only on written requests which are received by EGAT prior to the time fixed for the receipt of the bids. Negligence on the part of the Bidder in preparing his bid confers no right for the withdrawal of the bid after it has been opened. Whenever a bid has been withdrawn, it will be returned unopened to the Bidder.

B-7. Interpretation of Bidding Documents before Bid Opening

If a prospective Bidder is in doubt about the true meaning of any part of the Bidding Documents, the Bidder may submit to EGAT a written request for a reply or an interpretation; provided that sufficient time is allowed for a reply to reach the prospective Bidder prior to the date specified for bid opening. An interpretation will be given in the form of a Supplemental Notice furnished to all prospective Bidders. Receipt of all Supplemental Notices shall be acknowledged by each prospective Bidder on the Proposal. Oral interpretation of the Bidding Documents will not be binding.

B-8. Information to be Submitted with Bid

Each Bidder shall submit with his bid the following documents, data and information in English language in addition to any other information called for elsewhere in the Bidding Documents in order to enable EGAT to fully evaluate the Proposal of the Bidder :

- a. Name of manufacturer and country of origin and type or model of Equipment he proposes to furnish.
- b. Data, drawings, catalogue and descriptive materials which will show equipment arrangement, general dimensions, principles of operation, extent of factory assembly, and the materials from which parts are made.
- c. Sufficient references describing the technical experience of the manufacturers, including lists of the Equipment supplied and installed overseas. If possible, certificates issued by the user and/or consulting engineers supporting the said work and record of commercial operation in good condition should also be submitted.

- d. Copies of Auditor's certified balance sheet of the Bidder for the past three (3) consecutive years.
- e. In case the local manufactured Equipment is proposed, the sufficient documentary evidence, if any, showing that the manufacturers have been acknowledged for producing standard product by the Thai Industrial Standard Institute (TISI), Ministry of Industry, or registered with TISI, or ISO 9000 certified by the National Accreditation Council of Thailand (NAC) or obtained the privilege from the Board of Investment or accepted by EGAT for manufacture of such Equipment, is required to be submitted with the Bid.
- f. Sufficient evidence documents clearly demonstrating that a firm/company who changes its name, merges with, or acquires other company/companies, or forms a new company by merging its business unit with those of other companies, and the experience records of the new company clearly demonstrating that it has sufficient evidence of running the business as before.
- g. A statement of proposed minor deviations from the Specifications along with complete specifications and all necessary descriptive literature for any proposed alternative Equipment or procedure, as required under Article B-9. Deviations from Specifications.
- h. Where Proposal Data Forms are provided, the Bidder shall enter all information as directed.
- i. Where the Specifications provide for submission of a sample or samples, the Bidder shall submit same together with his bid.
- j. Joint Venture/Consortium Agreement with a statement that each member of a joint venture/consortium will be jointly and severally responsible and liable for the complete execution of the work (in case the Bidder is a joint venture or consortium).
- k. Confirmation Form of not being a Jointly Interested Bidder with other Bidders and not being a person who undertakes any actions as an Obstruction of Fair Price Competition, and Registration/Non-registration with the Revenue Department as a VAT registrant.

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

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

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

- m. A statement indicating that the parent manufacturer shall certify and be responsible for the design, production process and quality control. This information is required only for the Equipment specified in Data Sheet.

Should the Bidder fail to submit any of the document described above and neglect to submit the same to EGAT within the time as specified by EGAT, such failure shall be sufficient reason for rejection of his bid.

Verbal statements made by the Bidder at any time regarding quality, quantity, or arrangement of Equipment will not be considered.

If alternative Equipment is indicated in the bid, it shall be understood that EGAT will have the option of selecting any one of the alternates so indicated and such selection shall not be a cause for extra compensation or extension of time.

In case the Bidder proposes alternative Equipment, with the condition to supply any one of the alternates so indicated at his option, such bid will be considered conditional and may be considered sufficient reasons for rejection.

B-9. Deviations from Specifications

Unless otherwise provided in the Specifications, the quality of Equipment and workmanship shall comply in all respects with the Standards required under the bidding documents.

If the Bidder proposes any minor deviations from the specifications, he shall submit a statement of each proposed deviation referenced to the particular Article of these specifications, details on the design drawings or article, paragraph and section of referenced standards or specifications. Full details of all minor deviations together with confirmation shall be submitted with the bid in a form provided in Section C. The Bidder shall submit, with his bid, copies of the standards or specifications proposed for his deviations. In case there is no statement in the form provided in Section C in the Bidder's proposal on the proposed deviations, the bid shall be regarded by EGAT as conforming in all respects to the terms and conditions and Specifications as stated in the bidding documents at no additional cost to the bid price.

Notwithstanding the foregoing, it is at EGAT's sole discretion in determining whether any of such proposed deviations is acceptable and in determining whether it is minor or major deviation.

B-10. Rejection of Bids

EGAT reserves the right not to accept the lowest evaluated bid.

Bids shall be strictly based on the Specifications and terms and conditions in the Bidding Documents. Should any bid fail to comply with the terms and conditions stipulated in these Bidding Documents, especially those under Article pertaining to payment or be incomplete, conditional or obscure, or contain additions not called for, or irregularities of any kind, it will be liable to rejection.

EGAT also reserves the right to reject any or all bids submitted without giving reason or to reject the bid from any Bidder who fails to satisfy EGAT that the bid complies with the terms and conditions stipulated in these bidding documents without any non-compliance which is deemed substantial and advantageous over other Bidders.

B-11. Delivery Time

Delivery time required is indicated for each respective Price Schedule in the Proposal section of the Bidding Documents, and shall be carefully observed. However, no preference will be given in the bid evaluation for earlier delivery than the stipulated delivery period.

All bids specifying delivery time later than those indicated may be rejected.

B-12. Evaluation and Comparison of Bids

Bid prices pursuant to Article B-2. Bid Prices will be evaluated as follows :

1. The evaluation of bid prices shall be specified in Data Sheet.
2. Bid prices will be converted into Thai Baht at the selling exchange rates, published by the Bank of Thailand, www.bot.or.th between Baht and other currencies on the bid opening date.
3. The rate of import duty prevailed on the bid opening date will be used for the purpose of bid evaluation of CFR Thai Port Price.
4. The prices to be used for evaluation and comparison purpose shall be as follows :
 1. Ex-works price including VAT for the final sale direct to EGAT for locally manufactured Equipment
 2. CFR Thai Port of Equipment to be imported plus the calculated insurance premium of 0.0898% of [CFR price+10% (CFR price)], import duty, excise tax

(if any), value added tax to be assessed by the Thai Government at the port of entry for imported Equipment , and 0.6 % of CFR price for customs clearance

The rate of import duty to be used for price comparison shall be as follows:

- a) For Equipment consisting of separate components which are intended to contribute together as a functional unit and imported under partial import entry - using a normal single tariff rate published in the Customs Tariff Decree for such Equipment
- b) For other Equipment and spare parts
 - i) In case any imported Equipment and spare part is proposed from one (1) country of origin for the same item:
 - Country of Origin Under Free Trade Agreement (FTA) – using lower comparing rate between the FTA rate and the normal rate published in the Customs Tariff Decree;
 - Country of Origin Under Non FTA – using a normal rate published in the Customs Tariff Decree.
 - ii) In case any imported Equipment and spare part is proposed from different countries of origin for the same item, a normal rate published in the Customs Tariff Decree for such Equipment and spare part will be used for price comparison.
3. Cost of local transportation including VAT, if any
4. Cost of installation supervisor including VAT, if any
5. Guaranteed losses of Equipment, if any, at the rate as stipulated in the Proposal Data.

Price for optional items, if any, will not be taken into consideration; however, Bidders shall also quote the prices thereof as required.

B-13. Acceptance of Bids

EGAT will not be bound to accept the bid with the lowest indicated cost. EGAT reserves the right to accept the bid which in its judgement is the lowest evaluated bid. In making its selection, EGAT will take into consideration the conformity of the bid to the requirements of the Bidding Documents and Specifications, guaranteed delivery time, the suitability for the purpose intended and whenever applicable, compensating factors will

be applied to deviation or departures from Specifications. EGAT will also take into consideration whether the Bidder's experience, organization, facilities and financial resources will assure the successful carrying out of the Work under the Contract within the time specified.

B-14. Appeal

Disqualified or unsuccessful Bidders who see that their disqualification or failure are due to EGAT's non-compliance with EGAT's procurement regulations may appeal to EGAT within fifteen (15) Days from the date of receipt or announcement, whichever comes first, of EGAT's final evaluation result. An appeal shall be made in writing and clearly state the cause of appeal and argument with referred facts or regulations and related documents. Appealing does not constitute a ground for suspending the ongoing procurement process unless EGAT's Governor agrees otherwise.

The Contract or Purchase Order shall not be executed until the period of appeal has ended and there is no appeal. In the event there is an appeal during such period, the Contract or Purchase Order shall not be executed unless EGAT's Governor concurs.

Decision of EGAT's Governor is final and conclusive.

B-15. Award of Contract

The Contract will be awarded as soon as practicable after opening of the bids, to the Bidder with the lowest evaluated bid. EGAT reserves the right to award the Contract on the basis of standards and specifications as proposed by the Bidder, if in the opinion of EGAT, they are considered acceptable.

At the time of execution of the Contract, the successful Bidder shall furnish the performance security in accordance with the conditions of Contract in the specimen of performance security provided in the bidding documents.

Failure to comply with the condition as expressed in the specimen of performance security will lead to withdrawal of award and cancellation of Contract, and in this respect EGAT reserves the right to award the Contract to the Bidder with the next lowest evaluated substantially responsive bid and the Bidder who defaults shall have his bid security forfeited in favor of EGAT.

After EGAT notifies the successful Bidder that his bid has been accepted, EGAT will send the Bidder the Contract Documents incorporating all agreements between the parties not later than ninety (90) Days after receipt of notice of award of Contract.

Promptly but not later than fifteen (15) Days after receipt of the Contract, the successful Bidder shall sign and date the Contract and return it to EGAT.

B-16. Bidder's Responsibility

The Bidder shall be deemed to have carefully examined all of the terms, conditions and Specifications of this Invitation to Bid, and also to have fully informed himself as to all conditions, local or otherwise, affecting the carrying out of the Work of the Contract, and to have formulated an estimate of the facilities available and needed.

The Bidder shall also be liable to any rules and regulations as well as Acts enforced in the Kingdom of Thailand. Failure to do so will be at the Bidder's risk.

B-17. Supplemental Notices

Supplemental Notices to the Bidding Documents may be issued prior to the date of opening of bids to clarify the Bidding Documents or to reflect modifications in the design or Contract terms. Each supplemental notice issued will be distributed to each person or organization to whom the Bidding Documents have been issued. The recipient shall acknowledge receipt of each supplemental notice by signing and returning in a reasonable time the receipt form distributed with the supplemental notice. All supplemental notices issued shall become a part of the Contract Documents.

B-18. Cost of Bidding

Bidders will not be reimbursed for any expenses they may incur in preparing and submitting their bids.

B-19. Cancellation of Bid

EGAT reserves the right not to accept any quantity or item or schedule or package, or to cancel the bid without purchasing any item. Bidders shall not be entitled to claim EGAT for any losses and/or damages in this connection. EGAT also reserves the right to cancel the bid

should there be any reasonable grounds that bidder is not in good faith in submitting *bid* such as submitting false documents.

In case of bid cancellation, EGAT will not be responsible for any losses and/or damages and will not refund payment of Bidding Documents.

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SPECIMEN OF BID SECURITY

Whereas.....(hereinafter called "the Bidder") has submitted his bid dated.....for.....(hereinafter called "the Bid") under Invitation to Bid No.....KNOW ALL MEN by these presents that WE.....of.....having our registered office at.....(hereinafter called "the Guarantor") are bound unto Electricity Generating Authority of Thailand (hereinafter called "EGAT") in the sum of..... (in words :) for which payment well and truly to be made to EGAT, the Guarantor binds itself, its successors and assigns by these presents. Sealed with the Common Seal of the said Bank this.....(date).....day of.....(month).....,(year).....

THE CONDITIONS of this obligation are :

1. If the Bidder withdraws his bid during the period of bid validity specified in the Bidding Documents; or
2. If the Bidder, having been notified of the acceptance of his bid by EGAT during the period of bid validity;
 - (a) fails or refuses to execute the Contract, if required; or
 - (b) fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders;

We, the Guarantor, unconditionally undertake to pay to EGAT as the primary obligor, up to the above amount upon receipt of its first written demand, without EGAT having to substantiate its demand.

This guarantee will remain in force up to and including ninety (90) Days after the expiry date of the bid validity.

(Signature of the Bank)

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**SECTION C
PROPOSAL**

INVITATION TO BID NO. TILS-RX-01

PROPOSAL

FOR

SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR

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

C-1. Price Schedule

The undersigned Bidder, having carefully examined the Bidding Documents, hereby offers and proposes to perform the services and to furnish the Equipment on the basis of FOB Port of Shipment/Vessel or CFR Thai Port as specified in the Delivery Schedule and Distribution List for foreign supply or Ex-works delivery for local supply, in accordance with all provisions and conditions as described herein, all for the prices stated in the Schedule(s) attached.

Note : 1. Article C-1. Price Schedule

For imported Equipment, EGAT reserves the right to award the Contract on either FOB Port of Shipment/Vessel or CFR Thai Port basis.

2. Article E-12. Performance Security

The performance security required under Article E-12. Performance Security shall be ten (10) per cent of the Contract Price. Cost for furnishing the performance security shall be spread over the items proposed.

C-2. Penalty for Equipment Not Meeting Guaranteed Characteristics

The losses of Equipment shall be evaluated with the same rate as stipulated in the Proposal Data.

If the Equipment proposed fails to meet the guaranteed characteristics or the price of the measured losses is higher than the price of the guaranteed losses, the Contract price of Equipment shall be reduced by the different amount of the comparison between the price of the measured losses and the price of the guaranteed losses.

C-3. Guaranteed Delivery Time

Delivery Time of Equipment is required as indicated in the Delivery Schedule and Distribution List attached. The undersigned Bidder guarantees to make and to complete the delivery of Equipment proposed as required by EGAT.

Whenever the Equipment in any item are sub-itemized, the Contractor shall endeavor not to make partial shipment/delivery by sub-items.

In case of failure on the part of the Contractor to comply with the provision of the above paragraph, it is hereby understood that the Equipment in such particular items shall be deemed undelivered unless and until each all sub-items have been shipped/delivered.

C-4. Drawing and Document Submission Schedule

Drawing and Document Submission Schedule is required as indicated in Article F-11. Drawings and Documents to be Furnished by Contractor. The undersigned Bidder guarantees to submit all drawings and documents as required by EGAT.

C-5. Estimate of Deliveries

The estimated number of individual shipment/delivery, shipping point or points, estimated delivery date and estimated shipping weights and volumes for each individual shipping will be as follows :

<u>Number of Shipments</u>	<u>Item No.</u>	<u>Shipping Point</u>	<u>Estimated Delivery Date from Shipping Point</u>	<u>Total Weight kg.</u>	<u>Total Volume Cu.m.</u>
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----

C-6. Bid Security

Bid security in the amount of _____,
(in words)
_____ has been deposited with EGAT.
(number)

C-7. Supplemental Notices

The undersigned Bidder certifies that the following Supplemental Notices have been received for the Contract Documents :

Proposal Submission Date _____ Day of _____ A.D. _____

Firm's Name _____

By _____

Title _____

Firm's Address _____

Witness

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PART 1: PRICE PROPOSAL

PART 1 : PRICE PROPOSAL

PRICE QUOTATION INSTRUCTIONS

This part of the Bidding Document comprises :

1. Summary of Bid Prices
2. Price Schedules

Cost of Supply of Equipment comprises Foreign Portion and Local Portion. For Foreign Portion, Bidder is allowed to quote price in only four (4) different currencies. For Local Portion, default currency is Baht (THB).

Bidder shall fill in the price schedules in the soft file recorded and given in the CD, item by item. Then, the total prices for each schedule and Summary of Bid Prices will be automatically calculated.

Filling-in the data shall be in accordance with the following instructions :

1. Bidder shall fill in all data required in blue cells of the price schedules - Currency and Unit Price.
2. For local portion, the default is THB.
3. For foreign portion, Bidder shall fill a currency code in a column "Currency".

Remarks: Price Schedules are created in Microsoft Office Excel 2007.

INVITATION TO BID NO.TILS-RX-01
SUMMARY OF BID PRICE
SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

No.	Description	Currency	Supply of Equipment	Supply of Equipment	Foreign Currency	Local Currency
			Foreign Supply	Local Supply		
			CFR Thai Port	Ex-works Price (excluding VAT) Baht		
			Amount	Amount		
1	Schedule 1 : 500 kV Shunt Reactors					
	BID PRICE			Baht		Baht
	VAT			Baht		Baht
	SUMMARY OF BID PRICE			Baht		Baht

INVITATION TO BID NO.TILS-RX-01
Schedule 1 : 500 kV Shunt Reactors
SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR

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

Item No.	Description	Qty.	Unit	Currency	Supply of Equipment	Supply of Equipment	Foreign Currency	Local Currency
					Foreign Supply	Local Supply		(excluding VAT)
					CFR Thai Port	Ex-works Price (excluding VAT) Baht		Baht
					Amount	Amount	Amount	Amount
1-1	Complete set of Reactor where one complete set comprises of one unit of 55 MVAR, 525 kV, three phases shunt reactor and one unit of 0.55 MVAR, 110 kV, 650 kV BIL, neutral reactor	4					XXXXX	XXXXX
1-2	Spare parts for Item No. 1-1	lot					XXXXX	XXXXX
							XXXXX	XXXXX
							XXXXX	XXXXX
							XXXXX	XXXXX
1-3	Cost of installation supervisor for Item No. 1-1		Man-Day		XXXXX	XXXXX		
Total Price for Schedule 1								Baht

INVITATION TO BID NO.TILS-RX-01

Breakdown Price of Item No. 1-1

SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR

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

Item No.	Description	Currency	Supply of Equipment			Supply of Equipment
			Foreign Supply			Local Supply
			FOB Vessel	Cost of Transportation to Thai Port	CFR Thai Port	Ex-works Price (excluding VAT) Baht
			Unit Price	Unit Price	Unit Price	Unit Price
1-1.1a	Unit price of 55 MVAR, 525 kV, three phases shunt reactor complete with accessories as per Ratings and Features RF RX9411					
1-1.1b	Price of Insulating Oil for using in one (1) unit of reactor under Item No. 1-1.1a					
1-1.2a	Unit price of 0.55 MVAR, 110 kV,650 kV BIL, neutral reactor to connect with shunt reactor complete with tank mounted surge arrester and accessories as per Ratings and Features RF RX7712					
1-1.2b	Price of Insulating Oil for using in one (1) unit of reactor under Item No. 1-1.2a					

INVITATION TO BID NO.TILS-RX-01
Breakdown Price of Item No. 1-2
SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR

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

Item No.	Description	Qty.	Unit	Currency	Supply of Equipment				Supply of Equipment	
					Foreign Supply				Local Supply	
					FOB Vessel	Cost of Transportation to Thai Port	CFR Thai Port		Ex-works Price (excluding VAT) Baht	
Unit Price	Unit Price	Unit Price	Amount	Unit Price	Amount					
1-2.1a	1550 kV BIL, HV Bushing For Item No. 1-1.1a	1								
1-2.1b	650 kV BIL, Neutral Bushing For Item No. 1-1.1a	1								
1-2.1c	650 kV BIL, HV Bushing For Item No. 1-1.2a	1								
1-2.1d	110 kV BIL, Neutral Bushing For Item No. 1-1.2a	1								
1-2.2	120 kV Surge Arrester as per Ratings and Features RF SA7D01 For Item No. 1-1.2a	1								
1-2.3a	Complete Set of one or two units of each type and each size of auxiliary relay and contactor (two units are required where five units or more of each type and each size are provided per one reactor) For Item No. 1-1.1a	2								
1-2.3b	Complete Set of one or two units of each type and each size of auxiliary relay and contactor (two units are required where five units or more of each type and each size are provided per one reactor) For Item No. 1-1.2a	2								
Total Breakdown Price of Item No. 1-2										Baht

INVITATION TO BID NO.TILS-RX-01
Service of Installation Supervisor (Schedule 1)
SUPPLY OF 55 MVAR 500 KV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

Item No.	Description	Qty.	Unit	Currency	Foreign Currency		Local Currency (excluding VAT) Baht	
					Unit Price	Amount	Unit Price	Amount
1-3	Cost of installation supervisor for Item No. 1-1		Man-Day					

Note:

1. The quoted total man-days for installation supervisor shall be the required number of days for complete installation, erection, field test and commissioning of all equipment as specified.
2. In addition to the quoted total man-days above, EGAT will also pay the following :
 - a. Travelling time from and to Supervisor's home office as well as travelling time from and to the installation site including ten (10) working days of operation, if any, which will be at the same rate as the cost quoted per man-day.
 - b. Airfares round trip economy class between the Supervisor 's home office and Bangkok by the most expeditious and direct route.
3. Local transportation from and to installation site will be provided by EGAT.
4. If the working man-days are less than the quoted total man-days, the payment shall be on the basis of actual man-days.
5. For man-days exceeding the quoted total amount, no payment shall be made by EGAT. Any such additional man-days approved by EGAT shall be paid on the quoted man-days rate.

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PART 2: PROPOSAL DATA

SHUNT REACTOR

PROPOSAL DATA

PROCUREMENT REFERENCE _____

BIDDER _____

SCHEDULE NO. _____

ITEM NO. _____

- a. Manufacturer / Country _____
- b. Type / Type of Core _____ / _____
- c. Applied Standards _____
- d. Cooling Class _____
- e. Rated Capacity _____ MVAR
- f. Rated Frequency / Rated Continuous Current _____ Hz _____ A
- g. Winding Voltage Rating
 - Max. Continuous Voltage (High Voltage) _____ kV
 - Rated Voltage (High voltage / Neutral) _____ / _____ kV
 - BIL (High voltage / Neutral) _____ / _____ kV
 - Switching Surge _____ kV
- h. Bushing Voltage Rating
 - Max. Continuous Voltage (High Voltage) _____ kV
 - Rated Voltage (High voltage / Neutral) _____ / _____ kV
 - BIL (High voltage / Neutral) _____ / _____ kV
 - Switching Surge _____ kV
- i. Knee Point of Excitation Curve (% of Rated Voltage) _____ kV
- j. Over Excitation
 - At 105 / 125 / 140 % Rated Voltage (50 Hz) _____ / _____ / _____ s
 - At 100 % Rated Voltage (48 Hz) _____ s
 - Overvoltage for 10 s (50 Hz) _____ kV
- k. Partial Discharge Value _____ pC at _____ kV
- l. Audible Noise Level _____ dB(A)
- m. Positive Sequence Impedance / Tolerance _____ ohms _____ %
- n. Third Harmonic Current (% of Fundamental) _____ %
- o. Temperature Rise at 105 % Rated Voltage
 - Average Winding / Hottest Spot _____ / _____ °C
 - Insulating Oil _____ °C
- p. Insulating Material
 - Winding Insulation Paper - Manufacturer _____
 - Temp. Class _____
 - Pressboard and Other Insulating Material _____
 - Manufacturer _____
 - Temp. Class _____

PROPOSAL DATA

BIDDER _____

PROCUREMENT REFERENCE _____

SCHEDULE NO. _____

ITEM NO. _____

q. High Voltage Bushing

- Manufacturer / Country
- Model No.
- Type

- Power Freq. Withstand (Dry / Wet)
- BIL
- Rated Current
- Creepage Distance

Condenser Draw Lead

Solid Fixed Conductor

_____ / _____ kV

_____ kV

_____ A

_____ mm

r. Neutral Bushing

- Manufacturer / Country
- Model No.
- Type

- Power Freq. Withstand (Dry / Wet)
- BIL
- Rated Current
- Creepage Distance

Condenser Draw Lead

Solid Fixed Conductor

_____ / _____ kV

_____ kV

_____ A

_____ mm

s. Current Transformer

As Required Yes No

t. Insulating Oil

- Type
- Manufacturer / Country
- Manufacturer Type
- Applied Standard
- Oil can be mixed with ESSO UNIVOLT N61

Uninhibited Inhibited

Yes No

u. Total Weight with Oil

_____ kg

v. Weight of Core and Coil

_____ kg

w. Quantity of Oil Furnished

_____ Litre _____ kg

x. Dimension

- Shipping Dimension
- Overall Dimension

<u>Width</u>	<u>Length</u>	<u>Height</u>	
_____ m	_____ m	_____ m	
_____ m	_____ m	_____ m	

Guaranteed Characteristics

- Losses at Rated Voltage and Rated Frequency at 80 °C

_____ kW

Important Notice

1. The guaranteed characteristics of loss shall be evaluated and included in the bid price for cost evaluation with the rate of 221,000 Baht for each kW or part thereof of the guaranteed loss.

If the reactors fail to meet the guaranteed characteristics herein indicated, the price of reactors shall be reduced in accordance with the condition specified in Article : **Penalty for Equipment not Meeting Guaranteed Characteristics.**

NEUTRAL REACTOR

PROPOSAL DATA

PROCUREMENT REFERENCE _____

SCHEDULE NO. _____

BIDDER _____

ITEM NO. _____

- a. Manufacturer / Country _____
- b. Type / Type of Core _____ / _____
- c. Applied Standards _____
- d. Cooling Class _____
- e. Rated Capacity _____ MVAR
- f. Rated Frequency / Rated Continuous Current _____ Hz _____ A
- g. Winding Voltage Rating
 - Max. Continuous Voltage (High Voltage) _____ kV
 - Rated Voltage (High voltage / Neutral) _____ / _____ kV
 - BIL (High voltage / Neutral) _____ / _____ kV
 - Switching Surge _____ kV
- h. Bushing Voltage Rating
 - Max. Continuous Voltage (High Voltage) _____ kV
 - Rated Voltage (High voltage / Neutral) _____ / _____ kV
 - BIL (High voltage / Neutral) _____ / _____ kV
 - Switching Surge _____ kV
- i. Knee Point of Excitation Curve (% of Rated Voltage) _____ kV
- j. Over Excitation
 - At 105 / 125 / 140 % Rated Voltage (50 Hz) _____ / _____ / _____ s
 - At 100 % Rated Voltage (48 Hz) _____ s
 - Overvoltage for 10 s (50 Hz) _____ kV
- k. Partial Discharge Value _____ pC at _____ kV
- l. Audible Noise Level _____ dB(A)
- m. Positive Sequence Impedance / Tolerance _____ ohms _____ %
- n. Third Harmonic Current (% of Fundamental) _____ %
- o. Temperature Rise at 105 % Rated Voltage
 - Average Winding / Hottest Spot _____ / _____ °C
 - Insulating Oil _____ °C
- p. Insulating Material
 - Winding Insulation Paper
 - Manufacturer _____
 - Temp. Class _____
 - Pressboard and Other Insulating Material
 - Manufacturer _____
 - Temp. Class _____

PROPOSAL DATA

BIDDER _____

PROCUREMENT REFERENCE _____

SCHEDULE NO. _____

ITEM NO. _____

q. High Voltage Bushing

- Manufacturer / Country
- Model No.
- Type
- Power Freq. Withstand (Dry / Wet)
- BIL
- Rated Current
- Creepage Distance

Condenser Draw Lead

Solid Fixed Conductor

_____ / _____ kV

_____ kV

_____ A

_____ mm

r. Neutral Bushing

- Manufacturer / Country
- Model No.
- Type
- Power Freq. Withstand (Dry / Wet)
- BIL
- Rated Current
- Creepage Distance

Condenser Draw Lead

Solid Fixed Conductor

_____ / _____ kV

_____ kV

_____ A

_____ mm

s. Current Transformer

As Required Yes No

t. Insulating Oil

- Type
- Manufacturer / Country
- Manufacturer Type
- Applied Standard
- Oil can be mixed with ESSO UNIVOLT N61

Uninhibited Inhibited

Yes No

u. Total Weight with Oil

_____ kg

v. Weight of Core and Coil

_____ kg

w. Quantity of Oil Furnished

_____ Litre _____ kg

x. Dimension

- Shipping Dimension
- Overall Dimension

<u>Width</u>	<u>Length</u>	<u>Height</u>
_____ m	_____ m	_____ m
_____ m	_____ m	_____ m

Guaranteed Characteristics

- Losses at Rated Voltage and Rated Frequency at 80 °C

_____ kW

Important Notice

The proposed guaranteed losses shall not be more than 20 kW, EGAT will not accept the neutral reactor with the measured losses exceeding 20 kW when corrected to 80 °C.

Regardless of Article B-12, Evaluation and Comparison of Bids, item 4.5, the proposed guaranteed losses will not be used for cost evaluation.

SURGE ARRESTER

PROPOSAL DATA

PROCUREMENT REFERENCE _____

SCHEDULE NO. _____

ITEM NO. _____

BIDDER _____

- | | | |
|--|-----------------------|--------------------------|
| a. Manufacturer / Country | _____ | |
| b. Type / Model / Catalog No. | _____ | |
| c. Applied Standards | _____ | |
| d. Class (Station or Distribution) | _____ | |
| e. Arrester Voltage Rating | _____ | kV rms |
| f. Duty Cycle Current | _____ | kA |
| g. Arrester Insulation Withstand
- BIL / 1 Min Dry / 10 s Wet | _____ / _____ / _____ | kV |
| h. Rated Frequency | _____ | Hz |
| i. Maximum Continuous Operating Voltage (MCOV) | _____ | kV rms |
| j. Maximum Equivalent Front-of-wave
Protective Level | _____ | kV crest |
| k. Maximum Switching Surge Protective Level | _____ | kV crest |
| l. Maximum Discharge Voltage at 5/ 10 / 20 kA | _____ / _____ / _____ | kV crest |
| m. One Minute Energy Absorption Capability
at Maximum L-G Voltage (45 °C Ambient) | _____ | kJ/kV |
| n. Power Frequency Reference Voltage | _____ | kV rms |
| o. Power Frequency Reference Current | _____ | mA peak/ cm ² |
| p. Leakage Current at
-MCOV | _____ | mA |
| -Nominal System L-G Voltage | _____ | mA |
| q. RIV at 1.05 Max. System L-G Operating Voltage | _____ | μV |
| r. Creepage Distance of Insulator | _____ | mm |
| s. Insulator Color | _____ | |
| t. Weight | _____ | kg |
| u. Discharge Counter | | |
| -Manufacturer / Country | _____ | |
| -Type / Model | _____ | |
| -Minimum Impulse Registration | _____ | A |
| -Registration Capability per Second | _____ | |
| -Indicating Ammeter Scale | _____ | mA peak |

Manufacturer's successful operation supply record in overseas country for Shunt Reactor

Manufacturer / Country : _____ / _____

Customer / Country	Qty.	Rated Capacity (MVAR)	Basic Insulation level (kV)	Max. Continuous System Voltage (kV)	Rated frequency (Hz)	Type of cooling	Type / Model No.	Date of Operation

The above information is to prove that manufacturer has experience conforming to that required by Article relevant to Eligibility of Bidders.

Manufacturer's successful operation supply record in overseas country for Neutral Reactor

Manufacturer / Country : _____ / _____

Customer / Country	Qty.	Rated Capacity (MVAR)	Basic Insulation level (kV)	Max. Continuous System Voltage (kV)	Current Rating (A)		Rated frequency (Hz)	Type / Model No.	Date of Operation
					Continuous	10 minutes			

The above information is to prove that manufacturer has experience conforming to that required by Article relevant to Eligibility of Bidders.

Manufacturer's successful operation supply record in overseas country for Surge Arrester

Manufacturer / Country : _____ / _____

Customer / Country	Qty. (3-phase sets)	Max. System Voltage (kV)	Equipment Rating				Type / Model No.	Date of Operation
			MCOV (kV)	Duty cycle current (kA)	Short Circuit Current Rating (kA)	1.2/50 Impulse voltage (kV)		

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PART 3: DELIVERY SCHEDULE AND DISTRIBUTION LIST

Invitation to Bid No.TILS-RX-01

Delivery Schedule and Distribution List

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

Schedule 1 : 500 kV Shunt Reactors

Item No.	Description	Qty	Job no.	Substation	Delivery Required by EGAT (within months after receipt of Award of Contract)
					CFR Thai Port / Ex-works / DDP EGAT's Store
1-1	Complete set of 55 MVAR, 525 kV, three phases shunt reactor and 0.55 MVAR, 110 kV, 650 kV BIL, neutral reactor	2	TILS-01-S01	SRT2	16
		2	TILS-01-S02	TS	16
1-2.1a	1550 kV BIL, HV Bushing for item 1-1.1a	1	TILS-01-S02	TS	16
1-2.1b	650 kV BIL, Neutral Bushing for item 1-1.1a	1	TILS-01-S02	TS	16
1-2.1c	650 kV BIL, HV Bushing for item 1-1.2a	1	TILS-01-S02	TS	16
1-2.1d	110 kV BIL, Neutral Bushing for item 1-1.2a	1	TILS-01-S02	TS	16
1-2.2	120 kV Surge Arrester for item 1-1.2a	1	TILS-01-S02	TS	16
1-2.3a	Complete Set of one or two units of each type and each size of auxiliary relay and contactor (two units are required where five units or more of each type and each size are provided per one reactor) for item 1-1.1a	1	TILS-01-S01	SRT2	16
		1	TILS-01-S02	TS	16
1-2.3b	Complete Set of one or two units of each type and each size of auxiliary relay and contactor (two units are required where five units or more of each type and each size are provided per one reactor) for item 1-1.2a	1	TILS-01-S01	SRT2	16
		1	TILS-01-S02	TS	16

Thai Port = Laem Chabang Port, Chon Buri

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**SECTION D
CONTRACT**

CONTRACT
SUPPLY OF 55 MVAR 500 kV SHUNT REACTOR
TRANSMISSION SYSTEM IMPROVEMENT PROJECT
IN LOWER SOUTHERN REGION TO ENHANCE SYSTEM SECURITY

No. _____

This Contract is executed and delivered this _____ day of _____,
B.E. _____ (A.D. _____), between

ELECTRICITY GENERATING AUTHORITY OF THAILAND

represented by _____ of said Authority, hereinafter called "EGAT", and

(Contractor)

represented by _____, age _____ years, nationality _____, hereinafter called
the "Contractor".

EGAT and the Contractor mutually agree as follows :

D-1. Contract Documents

The following documents attached to this Contract are incorporated and made a part of this
Contract, as though fully written out and set forth herein :

Data Sheet

- A. Invitation to Bid
- B. Instructions to Bidders
- C. Contract Price, Delivery Time of Equipment and Proposal Data
- D. Contract
- E. General Conditions
- F. Special Conditions
- G. Ratings and Features
- H. Bill of Materials (None)
- I. Specifications
- J. Drawings (None)
- K. Supplemental Notices

L. Attachments :

M. Changes :

All of the foregoing documents are referred to herein as the Contract Documents. They are also incorporated into this Contract and made a part hereof all codes, designations, standards, standard specifications and similar Equipment which are referred to in the Specifications and Special Conditions.

D-2. Acceptance of Proposal

EGAT has accepted the proposal of the Contractor for furnishing the Equipment in conformity and in accordance with and subject to all the terms and conditions of these Contract Documents.

D-3. Agreement

The Contractor agrees to sell and EGAT agrees to buy the Equipment as described in these Contract Documents.

D-4. Obligation of Contractor

The Contractor agrees to perform well and faithfully all of the services and to furnish all of the Equipment described in these Contract Documents, and to supply and provide all Equipment, labor and other things requisite for or incidental to the said Work.

D-5. Obligation of EGAT

EGAT agrees, subject to the terms and conditions of these Contract Documents, to pay to the Contractor the amount shown, and at the rates and times and in the manner set forth in these Contract Documents.

D-6. Mutual Obligations

EGAT and the Contractor mutually agree to perform, fulfill, abide by, and submit to any and all of the provisions and requirements and all matters and things contained or expressed in, or reasonably to be inferred from these Contract Documents.

D-7. Deposit of Performance Security

The Contractor agrees to deposit with EGAT an acceptable performance security in accordance with the Contract Documents.

D-8. Assignment

The Contract or any part thereof shall not be assigned or pledged without the written consent of EGAT, nor shall the Contractor assign or pledge any money due, or to become due, to him hereunder, without the prior written consent of EGAT.

D-9. Notices

All notices called for by the terms of this Contract shall be effective only at the time of receipt thereof and only when received by the parties to whom they are addressed at the following addresses :

EGAT : Governor
Electricity Generating Authority of Thailand
Bangkruai, Nonthaburi 11130
Thailand

Contractor : _____

All notices called for by the terms of this Contract shall be in the form of registered letters or facsimile in the English language.

D-10. Integration

EGAT and the Contractor agree that this Contract, including the Contract Documents, expresses all of the agreements, understandings, promises, and covenants of the parties, and that it integrates, combines, and supersedes all prior and contemporaneous negotiations, understandings, and agreements, whether written or oral, and that no modification or alteration of this Contract shall be valid or binding on either party, unless expressed in writing and executed with the same formality as this Contract, except as may otherwise be specifically provided in this Contract.

D-11. Counterpart

This Contract is executed in *two (2)* identical counterparts: *one (1)* for EGAT and one (1) for the Contractor.

ELECTRICITY GENERATING AUTHORITY
OF THAILAND

CONTRACTOR :

BY _____
()

BY _____
()

WITNESS :

WITNESS :

BY _____
()

BY _____
()

DRAFT

SECTION E
GENERAL CONDITIONS

GENERAL CONDITIONS

E-1. Definitions

Whenever the following terms are used in the Contract Documents, they will have the following meanings :

- EGAT : The Electricity Generating Authority of Thailand, having its Head Office at Nonthaburi, Thailand, and its authorized representative or representatives
- Engineer : Firm or company assigned by EGAT to provide engineering, consulting or construction management services in support of EGAT
- Bidder : Any person or firm or company or joint venture or consortium of firms submitting bid to EGAT for furnishing the services and Equipment described in the Contract Documents, in response to this Invitation to Bid
- Contractor : Any person or firm or company or joint venture or consortium of firms including appointed representatives, successors and assignees thereof, whose bid has been accepted by EGAT for furnishing of the services and Equipment described in the Contract Documents
- Subcontractor : Any person or firm or company (other than the Contractor) to whom any part of the Contract has been sublet, with the consent of EGAT, by the Contractor
- Contract : The agreement between EGAT and the Contractor, and all Appendices and Schedules thereto including Invitation to Bid, Instructions to Bidders, Proposal, General Conditions, Special Conditions, Specifications, Ratings and Features, Drawings, Supplemental Notices and any other documents referred to in, or connected with the Contract, even though the said documents are issued after execution of the Contract
- Contract Price : The sum specified in Section C which is inclusive of VAT (if any) subject to such additions thereto or deductions therefrom as may be made under the provisions hereinafter contained

Equipment	:	Machinery, apparatus, materials, goods, including accessories and spare parts to be supplied under the Contract and specifically described in the Specifications
Work	:	All the work to be done by the Contractor for design manufacture, shop test, transportation, and delivery of the Equipment ex-works, FOB Port of Shipment/Vessel or CFR Thai Port or at EGAT's store/site as agreed, including, if required, supervision for installation at site and supervision for field tests of the Equipment under the Contract
Thai Port	:	Commercial ports in Thailand including but not limited to Bangkok Port, Laem Chabang Port, Sriracha Harbour Port, Siam Seaport, Maptaphut Port, Songkhla Port, Phuket Harbour Port or Suvarnabhumi Airport, as the case may be
Bangkok Port	:	Bangkok Wharf (Klong Toey Port) and all other commercial ports in Bangkok Metropolitan area
Supervisor (if required)	:	Contractor's employee assigned as installation supervisor including assistant supervisor, to supervise and be responsible for the installation, erection, adjustment, field tests, and commissioning of the Equipment supplied under the Contract
Option (if any)	:	Equipment to be quoted by the Bidder which EGAT reserves the right to accept or omit in whole or in part
Year	:	Calendar year
Month	:	Calendar month
Day	:	Calendar day

E-2. Intent of Contract Documents

All of the Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all. In the case of any discrepancy between any of the Contract Documents, or any defective description or ambiguity, the matter shall be promptly submitted to EGAT, which shall promptly make a determination in writing. Any adjustment by the Contractor without this determination shall be at the Contractor's own risk and expense. In all cases of discrepancy, defective description, or ambiguities,

the interpretation given by EGAT shall be binding on the Contractor, subject to the provisions of Article E-31. Dispute Resolution, included in these General Conditions.

E-3. Applicable Law and Legal Jurisdiction

The applicable law of this Contract shall be the law in force in the Kingdom of Thailand. Should there be any ambiguity or discrepancy arising out of or in connection with the Contract Documents, the interpretation thereof shall be made in accordance with Thai laws. Any litigations between the parties that may arise out of or in connection with this Contract or the breach or termination thereof or the performance of work thereunder shall be submitted to the Court of Thailand for decision, except as may be otherwise specifically provided in these Contract documents.

E-4. Statutory Requirements

Throughout the continuance of the Contract, the Contractor shall conform to all laws of the Kingdom of Thailand, and to all regulations, by-laws, ordinances, or orders made thereunder, and to the lawful requirements of any public, municipal, or other authority, in any way affecting or applicable to the Contractor or its operations.

E-5. Patents and Copyrights

The Contractor shall indemnify and hold EGAT, its officers, agents, and employees harmless against and from liability of any nature or kind, including costs and expenses for or on account of any copyrighted or uncopied composition, secret process, patented or unpatented invention, article, or appliance manufactured, delivered, or used in carrying out the Work under the Contract. All drawings and the information contained therein as well as the use of any process, material or Equipment developed in the course of carrying out the Work under the Contract shall become the property of EGAT where EGAT shall have the right to use any or all of them for any purpose either for present or future projects. For the avoidance of doubt, none of them will be used solely for any commercial benefit which is not related to EGAT work.

E-6. Subcontracts

The Contractor shall not assign or transfer the Contract or any part thereof or any benefit or interest therein or thereunder, any monies due or become due under this Contract to any other person or persons.

The Contractor shall not be allowed to subcontract the whole of the Work under this Contract. Subcontracting of any part of the Work shall be subject to the prior written consent of EGAT. Such consent, if given, shall not relieve the Contractor from full and entire responsibility under this Contract.

If the Contractor desires to subcontract any part or parts of the Work called for by the Contract, he shall notify EGAT in writing to that effect and shall state in such notice the nature and extent of the part or parts of the Work called for by the Contract proposed to be subcontracted and name of the person proposed as Subcontractor. Unless and until written approval is given by EGAT, approval for which shall not be unreasonably withheld, the Contractor shall not subcontract any part of the Work. All requirements specified in these Contract Documents shall be applicable to Subcontractors also.

No contractual relation shall exist between EGAT and the Subcontractors, and the Subcontractors are not to enjoy any privileges conferred on the Contractor by this Contract.

Any Work done by any Subcontractor who has not been approved by EGAT shall be subject to rejection or stoppage of Work by EGAT. In such case the Contractor cannot claim delay or request for time extension of the Contract completion date and/or make financial claim to EGAT.

E-7. Export Charges

All tariffs, duties and other taxes or charges levied by the country of origin of the Equipment shall be paid by the Contractor, and such expenses shall be included in the cost of the Equipment.

E-8. Import Duty and Taxes

EGAT will pay all costs of procuring the necessary permits and licenses for importation into Thailand, and will pay import duty and any taxes including value added tax imposed at the port of entry on the Equipment to be supplied by the Contractor and imported into Thailand for the Work under this Contract.

EGAT will not pay import duty and taxes on either the personal effects of the Contractor's employees, such as personal articles, household furnishings and appliances, and goods of any kind imported for the personal use of the Contractor's employees whether imported by an employee or by the Contractor, or in respect of food, tobacco, liquor and other commissary goods imported by the Contractor or by his employees.

EGAT will not pay import duty and taxes including value added tax on equipment, tools, instruments and machinery imported by the Contractor for purpose of carrying out the work under the Contract. All processes of importation shall be arranged by the Contractor.

Equipment, tools, instruments and machinery which are certified by the Contractor that they are required for installation, test and commissioning of the Work at the site and they are intended for re-exportation can be temporarily exempted from import duty and taxes including value added tax. All Equipment thereof shall be imported under the name of the Contractor and be in accordance with the rules and regulations of the Customs Department of the Kingdom of Thailand.

EGAT will assist the Contractor for such temporary exemption of import duty and taxes including value added tax by issuing a letter confirming such temporary import. Import duty and taxes including value added tax for the temporarily imported Equipment shall be paid by the Contractor to the Customs Department before re-exportation at the rate to be specified by the Customs Department at the time of importation for the whole period they have been imported into the Kingdom of Thailand. Temporary importation of the Equipment is subject to approval of the Customs Department and the deposit of a bond with the Customs Department in the amount to be notified by the Customs Department is required. All costs for submission of information and data if required by the Customs Department and the cost of provision of the bond shall be borne by the Contractor.

In view of numerous advantages, the ATA Carnet system or other systems may be arranged for shipment of the said temporarily imported equipment by the Contractor (if required). Any charge incurred and/or any liability shall be borne by the Contractor.

E-9. Value Added Tax

Pursuant to the Revenue Code of Thailand, EGAT shall be responsible and pay when due for the value added tax imposed on the supply of Equipment, including local transportation (if any) and/or on the provision of services under this Contract. EGAT shall in no case be responsible for the value added tax collectible on any payment made by the Contractor under any subcontract or under any other circumstances and the Contractor shall comply with the rules and regulations of the Revenue Code of Thailand.

In case there is any change on the rate of value added tax imposed by the Government of Thailand, the amount of value added tax comprised in the Contract Price shall be adjusted to reflect such change, provided that the price of the Work shall remain unchanged.

E-10. Income and Other Taxes

Income and other taxes assessed or collected by the Government of Thailand, or any subdivision thereof, or any municipality therein on the Contractor and his employees shall be under the responsibility and account of the Contractor.

In accordance with the Revenue Code of Thailand, should the payment under this Contract be subject to income tax and withholding tax of any kind is required to be withheld by EGAT, such withholding tax shall be deducted by EGAT from each payment and EGAT will be responsible to remit such withholding tax to the Revenue Department of Thailand on behalf of the Contractor. In case any payment being made through the letter of credit or being made directly from foreign source whereby the withholding tax cannot be deducted from payment, the Contractor is required to immediately inform EGAT once each such payment is made to the Contractor, and the withholding tax of which will be paid from EGAT's own fund to the Revenue Department in the same manner as aforesaid. Such withholding tax amount as advanced by EGAT on behalf of the Contractor shall be reimbursed by the Contractor to EGAT within the period of time fixed by EGAT.

In the case where the Contractor considers that the transaction under this Contract is exempted from income tax of Thailand (under any circumstance), the Contractor shall submit, together with his proposal(s), a statement detailing such exemption and the valid documentary evidence. Should EGAT rely on the statement so submitted, no deduction for withholding tax shall be made from payment. However, if the tax authority of Thailand determines that such exemption is not applicable, the Contractor shall then be responsible for the amount(s) equal to the withholding tax, plus the amount(s) of tax exceeding those of withholding tax, including the surcharge and/or penalties imposed on EGAT and the Contractor. The responsibility and liability of the Contractor as provided in the preceding sentence shall survive termination of the Contract.

If the Contractor fails to immediately inform EGAT of the payment as required under the second paragraph preventing EGAT from remitting the withholding tax to the Revenue Department within seven (7) Days from the end of the month in which such payment is made, or fails to pay and/or reimburse EGAT for any amount required under this Article within the period of time fixed by EGAT, such period not to be shorter than fifteen (15) Days from the date of EGAT's notice for payment, EGAT has the right to claim directly from the Contractor or claim from Performance Security or Maintenance Security, as the case may be, or deduct or setoff from any money due to the Contractor under this Contract

for the outstanding amount, surcharge and/or penalty (if any) together with interest at the rate of Minimum Overdraft Rate (MOR) plus two (2) per cent calculated from the due date up to the date the payment is made in full.

EGAT will proceed with the tax matters under the Contract by relying on the information and document submitted by the Contractor in relation to the Bidder's status and tax liability. If the Revenue Department of Thailand differently determines the status and tax liability, the Contractor shall be responsible and liable for any cost and expense, penalty and/or surcharge incurred and/or imposed on him and EGAT in relation thereto.

E-11. Fees and Duties

Any and all immigration fees, stamp duties, and other fees assessed or collected by the Government of Thailand, or by any subdivision thereof, or by any municipality therein, on this Contract, on the Contractor and/or his personnel shall be paid by the Contractor. Any taxes collectible under this Contract, other than those stipulated in this Contract, shall be at the responsibility and account of the Contractor.

The stamp duty for any service contract (Construction, Hire of Work, Consultancy Service, Transportation, Supervisor, etc.) with the Contract value of the service portion lower than baht 200,000.- is required to be affixed by the Contractor on the original copy and the counterpart of the Contract. In case the value of the service portion is baht 200,000.- and over, payment of such stamp duty by the Contractor shall be made in cash to the Revenue Department of Thailand or its authorized subdistrict offices. In either case, the stamp duty is required to be affixed or paid, as the case may be, within fifteen (15) Days after the date of Contract execution, otherwise the Contractor shall be liable to pay for any and all penalties imposed for the delay as required by law.

The Contract value of the service portion to be calculated for stamp duty under this provision shall be the price excluding value added tax.

For a foreign Contractor who has no representative in Thailand, EGAT will, upon receipt of written request from the Contractor, affix or pay for stamp duties from EGAT's own fund on behalf of the Contractor, the Contractor is therefore required to reimburse EGAT for such stamp duties plus any and all penalties imposed by law for delay, if such delay is due to Contractor's failure to make written request to EGAT as aforesaid within a reasonable period of time.

If the Contractor fails to reimburse EGAT for any and all amount as required under this Article within the period of time fixed by EGAT, such period not to be shorter than fifteen (15) Days from the date of EGAT's notice for payment, EGAT has the right to claim directly from the Contractor or claim from Performance Security or Maintenance Security,

as the case may be, or deduct or setoff from any and all money due to the Contractor under this Contract for the outstanding amount together with interest at the rate of Minimum Overdraft Rate (MOR) plus two (2) per cent calculated from the due date up to the date the payment is made in full.

E-12. Performance Security

The Contractor shall, at the time of execution of the Contract, deposit with EGAT a performance security for the due and proper performance of this Contract in the amount of ten (10) per cent of the total Contract Price. The performance security shall insure payment of any obligations, penalty, damages, liquidated damages, or expenses for which the Contractor may become liable to EGAT.

The amount of the performance security shall be adjusted or the Contractor may deposit a new performance security in the amount of ten (10) per cent of the additional Contract Price to cover the Contractor's obligation in case the Contract Price is increased due to change of the Work under the Article E-21. Changes and Extra or Omitted Work.

The performance security shall be in the form of a cash deposit, *or a certified cheque issued by a local bank, or a cashier cheque issued by a local bank*, or a bank guarantee or letter of guarantee issued only by a local bank or an acceptable financial institution in Thailand, or by a foreign bank counter-guaranteed by a local bank and, made payable to EGAT in the same currency as that of the Contract. In case of a cash deposit, only Thai baht portion of the Contract Price can be made. EGAT may at any time, upon application by the Contractor, approve the substitution for any performance security held under this Article by other performance security on such terms and conditions as may be approved by EGAT. The Contractor shall bear the cost of the performance security.

The conditions of the guarantor's obligations in the performance security shall include, inter alia, the following :

- (1) The guarantor shall unconditionally guarantee, as primary obligor and not as surety merely, payment of any obligations, penalties, damages, liquidated damages, or expenses for which the Contractor may become liable to EGAT.
- (2) No extension of time, change in, addition to, or other modification of the terms of the Contract or Work to be performed thereunder, or of the specifications or other Contract Documents shall in anyway release the guarantor from any liability under the performance security, and the guarantor shall thereby waive notice of any such extension of time, change, addition or modification.
- (3) The performance security shall be valid and remain in full effect from the date of execution of the Contract until the issuance of the Acceptance Certificate by

EGAT or the acceptance of Equipment deemed to be made by EGAT against submission of the Maintenance Security accepted by EGAT.

Unless and until an official receipt is issued in respect to a security deposit, EGAT will not recognize or accept any such deposit as fulfilling the requirements of this Article. Failure to deposit a performance security at the time specified above in this Article or such extended time as may be approved by EGAT shall be a breach of this Contract and EGAT is entitled to terminate the Contract or suspend any payment for Work performed until the performance security has been accepted by EGAT. EGAT shall not be liable for any losses, expenses and/or damages resulting from such payment suspension.

If any performance security furnished under this Article becomes unacceptable to EGAT, or if any guarantor fails to furnish reports as to guarantor's financial condition from time to time, as requested by EGAT, the Contractor shall promptly furnish such additional or alternative security as may be required by EGAT from time to time to protect the interests of EGAT up to an amount equal to the amount of the security.

In the event of any default or breach of this Contract by the Contractor, EGAT may convert into money any performance security which does not consist of money, and the proceeds shall be deemed to be a cash deposit under this Article. EGAT shall not be liable for any cost, expenses and/or loss incurred in connection with such conversion.

The performance security, in case of a bank guarantee, or letter of guarantee, shall be in conformity with the specimen acceptable to EGAT as shown herein at the end of these General Conditions.

E-13. Inspection and Tests

All Equipment furnished and all work performed under this Contract shall be subject to inspection by EGAT or EGAT's authorized representative(s) at its option. EGAT shall have the right to inspect all Equipment during its manufacture or fabrication and prior to its preparation for shipment, and to witness any or all shop tests for which results are required under this Contract to be approved by EGAT.

The Contractor shall notify EGAT at least two (2) months in advance when and where the Equipment will be available for each inspection or test. Any expenses incurred by EGAT or EGAT's representative(s) to inspect the Equipment or attend the test caused by false call of the Contractor for inspection and tests shall be borne by the Contractor. The acceptance of any services and Equipment covered by these Contract Documents, or the making or waiving of any inspection or witnessing of any test, shall in no way relieve the Contractor of the responsibility for furnishing services and Equipment meeting all of the requirements of this Contract.

Shop tests required in the Specifications shall be at the Contractor's expense. All tools, instruments and other materials necessary for performance of the tests shall be furnished by the Contractor.

In the event the results of the tests do not satisfy the requirements of the Specifications or the guaranteed performance, the Contractor shall rectify to improve the Equipment until satisfactory results are obtained and shall conduct all necessary retests at his own expense.

Any delay in delivery due to the retest shall not constitute a release of the Contractor from his responsibility for delay. Any expenses incurred by EGAT in attending these retests shall be borne by the Contractor. EGAT shall have the right to send one or more of EGAT's employees, not as inspectors, to the Contractor's plant to witness the fabrication, assembly and testing of any or all parts of the Equipment being furnished under this Contract. The purpose of the visit is to familiarize EGAT's personnel with Equipment details and to assist them in future operation and maintenance. Travelling expenses and per diem of such employee or employees shall be borne by EGAT.

E-14. Preparation for Shipment and/or Delivery

The Contractor shall submit shipment and/or delivery schedule for EGAT's approval at least thirty (30) Days in advance before each shipment and/or delivery is made. No shipment and/or delivery shall be made prior to EGAT's approval which will be notified to the Contractor within fifteen (15) Days after receipt of the said shipment and/or delivery schedule.

All imported and local Equipment to be delivered under this Contract shall be satisfactorily packaged in such a manner to protect them from damage during transportation and for outdoor storage at the site in hot, wet, humid and dusty conditions. In addition, the imported Equipment shall also be satisfactorily packaged for moist tropical ocean shipment. Where necessary, heavy parts shall be mounted on skids so that cable slings for handling can readily be attached. Where it is unsafe to apply external slings to a package, attached slings shall be provided and shall project through the package so that attachment can readily be made.

In order to keep the damage to non-water proof Equipment during the transportation at minimum level, the Contractor and/or supplier is required to put an umbrella mark on every package of the Equipment.

In order to accelerate the dispatch of the Equipment to the site, the Contractor is required to arrange packaging of the Equipment in such a manner that a complete set of one unit shall be packed in package(s) or crate(s) with indication of designated substation but each individual package or crate shall contain the Equipment for only one unit or part of a

complete set of one unit or otherwise as directed in the Instructions for Packaging attached at the end of Section E. General Conditions.

For Power Transformer and Shunt Reactor, in addition, all accessories, which are packed in aforesaid manner shall be contained in a container per transformer except for transformer insulating oil, radiators and conservator including other accessories which for dimensional reason after packaging are unable to be contained in the said container. However, spare parts shall be contained in a separate container per each shipment or Contract to be awarded. The containers to be used shall become the property of EGAT. The dimensions of containers shall be as follows : -

<u>Container Dimensions</u>	<u>Door Dimensions</u>
Height 2.59 m.	Height 2.28 m.
Width 2.44 m.	Width 2.33 m.
Length 6.05 m.	

In addition, details of Equipment and substation destination per container shall be identified in Bill of Lading.

Detailed breakdown prices for spare parts of Equipment shall be also indicated in the invoice.

Prior to delivery of all Equipment, packaging details shall also be submitted to EGAT for approval.

The cost incurred for repair or replacement of any damages to the Equipment due to improper packaging shall be at the Contractor's expense.

Each individual package or crate shall be clearly and plainly tagged or marked for identification as follows:

EGAT, THAILAND
PROJECT NAME : _____
CONTRACT NO. : _____
SUBSTATION : _____
CASE NO. : _____
ITEM NO. : _____
DESCRIPTION : _____
EGAT'S SERIAL NO. : _____ (if any)

In addition to this, the following instructions shall be observed :

- a. Each box, crate, case, bundle or piece of loose Equipment shipped must show the following information clearly marked on its body :

1. Gross weight in kilograms
 2. Net weight in kilograms
 3. Dimensions in centimeters
- b. All boxes, crates, cases, bundles, loose pieces, etc. must be marked consecutively from No. 1 upward throughout all shipments to completion of the order without repeating the same number.
- c. The packing list must indicate whether shipment is partial or complete, and shall incorporate the following information on each container, etc., according to its individual shipping number:
1. Export case markings
 2. Case number
 3. Container number (for Power Transformer and Shunt Reactor)
 4. Item number
 5. Gross weight and net weight in kilograms
 6. Dimensions in centimeters
 7. Complete description of Equipment
 8. EGAT's serial No. (if any)

E-15. Clearance and Weight Limitations

The largest unloading facilities at Bangkok Wharf are 35 metric ton cranes. Lifts heavier than 35 tons will have to be handled by ocean freighter on-board lifting equipment. Ocean freighters of the 10,000 tons class regularly calling at Bangkok Wharf have off-loading capacities to handle 50 tons.

The largest unloading facilities at Laem Chabang Port are 30 metric ton cranes. Lifts heavier than 30 tons will have to be handled by ocean freighter on-board lifting equipment.

Generally, unloading at Thai Port and highway transportation are subject to the following limitations:

Dimensions	Limitations		
	Unloading at Bangkok Wharf/ Highway Transportation		Unloading at Laem Chabang Port/Maptaphut Port
Weight (tons)	60.0	>60.0-135.0	120.0
Width (meters)	3.5	3.5	4.5
Length (meters)	10.0	10.0	25.0
Height from Loading Platform (meters)	3.7	4.0	4.0

The Contractor shall therefore exercise due care to pack the Equipment to meet the above transport limitations.

For Power Transformer and Shunt Reactor, the shipping weight of the largest part is indicated in Ratings and Features.

E-16. Shipment

Shipment of Equipment from port of embarkation to the final port of discharge shall be effected by using Thai vessels through the sea freight forwarder appointed by the Contractor. The Contractor is required to notify EGAT of the name of the sea freight forwarder one (1) week prior to shipment.

According to the regulations of the Maritime Promotion Bureau, Marine Department (as amended from time to time), shipments by non-Thai vessels can be made after receipt of permission granted by the Maritime Promotion Bureau, Marine Department as requested by the Contractor.

The Contractor is, therefore, required to immediately contact the Maritime Promotion Bureau, Marine Department for such permission with supporting documents of the case thereof for arrangement of the permission in advance.

The Contractor shall follow all other regulations stated in the Mercantile Marine Promotion Act B.E. 2521 and the regulations of the Maritime Promotion Bureau, Marine Department (as amended from time to time).

The Contractor shall be liable for any and all costs and expenses, losses and/or damages suffered by EGAT as a result of the Contractor's failure to comply with such regulations.

For more information, the Contractor may contact the Maritime Promotion Bureau, Marine Department at telephone No. 66 2233 1311-8 extension 391, 393 and facsimile No. 66 2639 4780.

All imported Equipment shall be shipped on Conference Line or on seaworthy oceangoing vessels which are members or associate members of the International Association of Classification Societies (IACS) and ISM Code Certified Vessels. Vessels over fifteen (15) years of age shall not be used for shipment under this Contract unless they : -

- a) have been used for the carriage of general cargo on an established and regular pattern of trading between a range of specified ports and do not exceed twenty-five (25) years of age, or
- b) were constructed as containerships, vehicle carrier or double-skin open-hatch gantry crane vessels (OHGCs) and have been continuously used as such on an established and regular pattern of trading between a range of specified ports, and do not exceed thirty (30) years of age.

Shipment shall be made under deck except for such Equipment which for dimensional reasons cannot be stowed in the vessels hold. In case Equipment cannot be stowed in the vessel hold, permission shall be obtained from EGAT prior to loading such Equipment on deck. Such approval shall not be unreasonably withheld. The Contractor shall in any case be responsible for proper packing for protection of such Equipment loaded on deck of the vessel. Shipment of all Equipment by dry cargo container will be accepted, but all the incidental expenses shall be borne by the Contractor.

For shipment of Equipment under this Contract, transshipment is allowed.

Any delicate Equipment, materials, instruments and tools including but not limited to computers, electronic parts, etc., shall be shipped by airfreight. The Contractor shall be responsible for proper packing for protection of such Equipment loaded on cargo hold of the aircraft.

Air freight shipment to airport of disembarkation in Thailand shall be effected through the air freight forwarder appointed by the Contractor. The Contractor is required to notify EGAT of the name of the air freight forwarder one (1) week prior to shipment.

E-17. Documents Required for Each Shipment

a. For Seafreight

For accounting procedure, the Contractor is required to send to EGAT the bill of lading, invoice and master packing list immediately by facsimile but not later than

three (3) Days after the Equipment are actually loaded free on board (FOB Vessel) at the port of Shipment.

One (1) original negotiable bill of lading, three (3) original signed invoices and packing lists shall be mailed directly to EGAT by express airmail within four (4) working days after the date of departure of the ocean-going vessel from the port of shipment.

Two (2) original negotiable and five (5) copies of non-negotiable bill of lading, ten (10) original signed invoices and three (3) copies of packing lists shall be submitted to EGAT through the Bank within the time as specified in the letter of credit. - This requirement is applied only in case payment is made by letter of credit.

b. For Airfreight

For accounting procedure, the Contractor is required to send to EGAT the airway bill, invoice and master packing list immediately by facsimile but not later than three (3) Days after the Equipment are actually loaded on the air carrier at the airport of departure.

Three (3) original signed invoices and packing lists shall be attached to the airway bill and dispatched together with the airfreight shipment.

One (1) copy of airway bill, two (2) original signed invoices and packing lists shall be sent directly to EGAT by courier within four (4) working days after the date of departure of the carrier from the airport.

Two (2) copies of airway bill, ten (10) signed invoices and three (3) copies of packing lists shall be submitted to EGAT through the bank within the time as specified in the letter of credit. - This requirement is applied only in case payment is made by letter of credit.

To act in accordance with the rules and regulations of the Customs Department of the Kingdom of Thailand, as well as to enable EGAT to expedite clearing the Equipment from the Customs House accordingly, the following declarations, other than regular statements, have to be made in English in the invoice for any transaction concluded with EGAT.

- a. Country from which Equipment is purchased as well as country of origin; if the Equipment is produced in the country or group of countries where there are trade agreements between such country or group of countries and the Kingdom of Thailand, preferential treatment on import duty and taxes for importation of the Equipment is required;
- b. Electricity Generating Authority of Thailand as consignee and Thailand as consigning country
- c. Date and Number of Contract;

- d. Name of Project, if any;
- e. Marking and numbers, as well as gross weight and volume;
- f. Details of Equipment, i.e. names, kinds, qualities, quantities, net weights, and other particulars as available for each type including trademarks or other symbols of such Equipment. If there are no trademarks or symbols, the invoice shall indicate "no trademarks", "no symbols", as the case may be;
- g. Selling price or value of Equipment per unit expressed in the type of currency under transaction and representing actual price or value of Equipment as stated in the price schedules or price breakdown, as the case may be;

If the Contractor fails to specify the price or value of Equipment according to the Contract in the invoice prepared for shipment, the Contractor shall be held responsible for the following:

1. In case of over value or price of Equipment stated in the invoice, the Contractor shall be responsible for reimbursement to EGAT for the import duty and taxes (excluding value added tax) collected by the Customs Department and the insurance premium (excluding value added tax) on the over value or price of Equipment as well as interest. Value added tax imposed in connection thereto shall be EGAT's responsibility. The Contractor shall also refund to EGAT the amount of over value payment as well as interest. The interest to be applied under this Article shall be Minimum Overdraft Rate announced by Krung Thai Bank plus two (2) (MOR+2) percent calculated from the date of EGAT's payment of the over value payment, import duty and taxes as well as insurance premium until the date of the Contractor's settlement of the same in full.
 2. In case of under value or price of Equipment stated in the invoice, the Contractor shall be responsible for reimbursement to EGAT the surcharges imposed on additional import duty and taxes at the rate currently established by the Customs Department as well as interest (if any) and also shall be responsible for compensation to EGAT for cost incurred in repair or replacement of the damaged Equipment which is not covered by insurance due to under value or price of Equipment stated in the invoice.
- h. Other expenses:
 1. Packing charges (if any)
 2. Insurance premiums (if insured)
 3. Freight
 4. Others (if any)

The Contractor shall, at the time of shipment, prepare and submit a certificate of origin(s) for the Equipment required as per point a. above together with the invoice and other shipping documents for EGAT to obtain the benefit from preferential treatment on import duty and taxes for importation of the Equipment from the country or group of countries where there are

trade agreements between such country or group of countries and the Kingdom of Thailand. For each shipment, all items of Equipment requiring certificate of origin shall be included in only one (1) certificate of origin except as otherwise specified in any trade agreement. The trade agreements shall include but not be limited to the following:

1. Common Effective Preferential Tariff (CEPT) Scheme for the ASEAN Free Trade Area (AFTA);
2. Agreement between the Kingdom of Thailand and Japan for an Economic Partnership; and
3. Agreement between the Government of the Kingdom of Thailand and the Government of the People's Republic of China on Accelerated Tariff Elimination under the Early Harvest Programme of the Framework Agreement on Comprehensive Economic Cooperation between ASEAN and China.

If the Contractor advises EGAT in writing before shipment that it is unable to provide a certificate of origin to EGAT, the Contractor shall be responsible for all costs incurred including but not limited to reimbursement to EGAT for the excess amount of the import duty and taxes (except value added tax) paid by EGAT to Customs Department.

Further to the above, if the Contractor delays to provide a proper certificate of origin to EGAT, the Contractor shall be responsible for all costs incurred including but not limited to reimbursement to EGAT for the storage charges and the interest on the excess amount of import duty and taxes (except value added tax) paid by EGAT to the Customs Department at the rate of Minimum Overdraft Rate announced by Krung Thai Bank plus two (2) (MOR+2) percent calculated from the date of EGAT's payment of import duty and taxes up to the date of receipt of the excess amount of import duty and taxes refund from the Customs Department.

However, if the Contractor fails to provide such proper certificate to EGAT, the Contractor shall be responsible for all costs incurred including but not limited to reimbursement to EGAT for the storage charges and the excess amount of import duty and taxes (except value added tax) paid by EGAT to the Customs Department as well as interest on the said excess amount of import duty and taxes at the rate of Minimum Overdraft Rate announced by Krung Thai Bank plus two (2) (MOR+2) percent calculated from the date of EGAT's payment of import duty and taxes up to the date of acknowledgement that the certificate cannot be issued in conformity with requirement of the Free Trade Agreement.

The Contractor is also required to study the existing trade agreements and any new trade agreement between the Kingdom of Thailand and a country or group of countries published in the website of Customs Department (www.customs.go.th) and/or Ministry of Commerce (www.moc.go.th), and ask for more information from EGAT in order that EGAT can obtain the benefit from preferential treatment on import duty and taxes for importation of the Equipment from the country or group of countries where there are trade agreements between such country or group of countries and the Kingdom of Thailand.

Fullest conformity with the requirements of the Customs Department of the Kingdom of Thailand mentioned above is essential as a condition precedent.

Unless by force majeure, failure to furnish EGAT with these shipping documents and the certificate of origin within the specified period and strictly in accordance with conditions stipulated above thereby causing impossibility of making prompt customs clearance of the Equipment from Thai Port, the Contractor shall, upon receipt of the EGAT's notice, reimburse EGAT for go down rent / storage charge and other expenses arising from or in consequence of the nonconformity with the above specified requirement.

E-18. Force Majeure

The Contractor shall not be in default under this Contract because of any delays in delivery or in completion of the Work on the separable parts thereof which delays are caused by force majeure; provided, that the Contractor shall notify EGAT in writing of the cause of any such delay within fifteen (15) Days after the end of the event which results in the delay. Upon receipt of any such notice of delay, EGAT will promptly ascertain the facts and the extent of the delay and will extend the time for the delivery and assembly of the Equipment or the time for completing the Work when, in the opinion of EGAT, the delay is caused by force majeure or the findings of fact to justify an extension. EGAT's decision shall be binding on the Contractor, subject to the provision of Article E-31. Dispute Resolution included in these General Conditions.

"Force Majeure" shall be defined as any event, the happening or pernicious results of which could not be prevented even though a person against whom it happened or threatened to happen were to take such appropriate care as might be expected from him in this situation. (Normal rains, inundation, dearth of water, and the overturning or sinking of barges in canals, rivers, or streams and similar events shall not be considered as force majeure).

E-19. Transportation Insurance

Transportation insurance from the port of shipment/from the Contractor's premise(s) to EGAT's Store and/or EGAT's site will be under the responsibility of EGAT.

E-20. Transfer of Title

The title of ownership for the Equipment furnished under this Contract shall be passed to EGAT at the time the Equipment is actually loaded onto the vessel at the port of shipment, or into charge of the air carrier at the port of departure, or at the time the Equipment is actually delivered ex-works and the Contractor's statement or delivery order confirming delivery of the Equipment ex-works has been certified by EGAT's representative. However, this transfer of title shall not be construed as an acceptance of

the Equipment. The Contractor shall continue to be responsible for the quality and performance of the Equipment, and for their compliance with the Specifications as well as any loss, theft or damage of the Equipment during the course of execution of the Contract, until final acceptance of the Work by EGAT and the fulfillment of the guarantee provision of the Contract.

E-21. Changes and Extra or Omitted Work

EGAT may at any time authorize changes in, additions to, or deductions from the Equipment to be furnished under the Contract. Changes, additions, or deductions *shall* be authorized only by written notice served by EGAT upon the Contractor and such notice shall be treated as an integral part of the Contract. Adjustments, if any, in the amounts to be paid to the Contractor by reason of any such change, addition, or deduction shall be determined by one or more of the following methods :

- a. by unit price contained in the Price Schedules
- b. by an acceptable lump sum or unit price proposal from the Contractor
- c. on a cost-plus limited basis not to exceed a specific limit. A cost-plus limited basis is defined as the cost of Equipment, labor, and insurance, plus fifteen (15) per cent of the said cost to cover superintendence, general expense, and profit.

No claim for an addition to the Contract Price shall be valid unless authorized as described in this Article. If the parties are unable to agree to the method to be employed in determining adjustments in the Contract Price, the method shall be determined by EGAT.

E-22. Termination and Suspension of Contract

EGAT may, by written notice sent to the Contractor, terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for EGAT's convenience, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.

The Equipment that are completed and ready for shipment within thirty (30) Days after the Contractor's receipt of notice of termination shall be purchased by EGAT at the Contract terms and prices. For the remaining Equipment, EGAT may elect :

- a. to have any portion completed and delivered at the Contract terms and prices and/or

- b. to cancel the remainder and pay to the Contractor an agreed amount for partially completed Equipment and for materials and parts previously procured by the Contractor.

E-23. Default and Termination

Should the Contractor :

- a. fail to furnish the Equipment or carry out the Work in accordance with this Contract; or
- b. refuse or fail to prosecute the Work or any part thereof which shall ensure its completion within the time specified in this Contract or any authorized extension of time by EGAT; or
- c. fail to furnish the Equipment and/or complete the Work or any part thereof within the time specified in this Contract or any authorized extension of time by EGAT; or
- d. commit any breach or fail to comply with any of the provisions of this Contract; or
- e. notify EGAT in writing that the Contractor is unable or unwilling to furnish the Equipment or complete the Work or any part thereof; or
- f. become insolvent or bankrupt or make an arrangement or composition with the Contractor's creditors or, being a corporation, go into liquidation whether compulsory or voluntary (except for the purpose of reorganization); or
- g. by himself or by any person on his behalf, give or offer any money or benefit of forbearance to any employee of EGAT and/or any employee of the Engineer who has duties or responsibilities in connection with the acceptance of the proposal or the making of this Contract;

then, in any of such events, the Contractor shall be in default under this Contract, and EGAT may at his sole discretion take any one or more of the following actions that it considers appropriate :

- (i) suspend payments under this Contract until the default has been rectified;
- (ii) cancel or terminate the Contract in whole or in part;
- (iii) take that part of the furnishing of Equipment or the Work, in respect of which the delay or default has occurred, out of the hands of the Contractor or any other person in whose control or possession it is;

- (iv) reduce the Contract Price by an amount equal to the reduction in value to EGAT of the Equipment as actually delivered.

The Contractor shall be liable for all losses and/or damages including but not limited to the increased installation costs and increased administrative costs, suffered by EGAT as a result of the Contractor's default. The Contractor shall have no claim for payment with respect to Work thereafter performed.

All such damages may be recovered by EGAT from the Contractor in any court of competent jurisdiction or, without prejudice to that right, by deduction from any money due or becoming due to the Contractor under this Contract, or from any security deposited, or, after use of the property and materials of the Contract for completion of the work, as provided in this Contract, such property and materials may be sold and the proceeds shall be applied to any remaining obligations of the Contractor.

E-24. Indemnification by the Contractor

The Contractor shall fully indemnify and hold harmless EGAT and his employees and officers from and against any and all suit, actions (including any claim for copyright or patent infringement), demands, losses, costs, expenses (including attorney's fees and expenses) and damages of whatsoever nature, except for breach of contract, in respect of death or injury of any person or loss of damage to any property caused by any act or omission of the Contractor or the Contractor's own officers, directors, agents, employees, contractors or sub-contractors arising in any manner whatsoever, except any injury, death or property damage caused by the negligence of EGAT, his contractors, employees, officers, or agents.

E-25. Limitation of Liability

The liability of the Contractor to EGAT arising from default or termination under the Contract in aggregate shall not exceed the total Contract Price.

E-26. Consequential Damages

Neither party shall be liable to the other party for any indirect, incidental, consequential or punitive damages as a result of the performance or nonperformance of the obligations imposed pursuant to this Contract, unless such indirect, incidental, consequential or punitive damages are foreseen or could have been foreseen at the time of execution of the Contract.

E-27. Vesting of Contract in Receiver

If the Contractor shall compound with his creditors, or shall become bankrupt or insolvent, or carry on business under a receiver, or become incapable from any cause whatsoever of carrying out the Work, any such receiver or any person in whom by law the Contract shall become vested, shall forthwith give notice to EGAT of the fact that the Contract has become vested in it and shall take all reasonable steps to carry on the Work at a rate fulfilling the Contract requirements. Thereupon, if EGAT so desires, such receiver or other such person as aforesaid shall have the option, during the period of one (1) Month from the date when the Contract becomes so vested in it, of carrying out the Contract. In the event of the Work being stopped, this option shall be opened only for a period of fourteen (14) Days from the stoppage date. In the event of the receiver or such other person not electing to carry out the Contract or EGAT not approving the carrying out of the Contract by the receiver, the Contractor shall then be in default and EGAT may proceed in accordance with Article E-23. Default and Termination.

E-28. Extension of Time

If, by reason of any of the following :

- a. Negligence or default on the part of EGAT or its agents,
- b. Alteration in or addition to the Work,
- c. Suspension of the Work at the written direction of EGAT for reasons beyond the control of the Contractor,
- d. War, insurrection, riot or civil commotion or delay caused thereby,
- e. Strikes, not caused by the Contractor's management,
- f. Lawful order of civil or military authorities,
- g. Unusually natural calamities, acts of God,
- h. Any other unforeseen circumstance beyond the Contractor's control.

The Contractor claims that he has been unduly delayed in the progress of the Work, he shall make written request to EGAT for an extension of time for completion of the Work or any portion of it.

Should EGAT consider such claim to be valid, it will grant such extension of time as may seem reasonable to EGAT, without thereby prejudicing or in any manner affecting the validity of the Contract. No extension of time will be granted unless the Contractor makes

the written request within fifteen (15) Days after the end of the event which results in the delay.

Other than claiming an extension of time for completion of the Work or any portion of it, the Contractor shall not have any further recourse or claim against EGAT, nor shall he have any right of action against EGAT for loss or damage suffered by reason of such delay.

E-29. Failure to Meet Requirements

EGAT shall have the right to require the Contractor to make any changes in the Equipment or Work covered by this Contract, which may be necessary in the opinion of EGAT, to make the Equipment or Work conform to the requirements of the Contract Documents, without additional cost to EGAT. Any defects in the Equipment or workmanship or other failure, to meet the requirements of the Contract, including errors and omissions on the part of the Contractor, which are disclosed prior to final payment or prior to acceptance by EGAT, or after completion of all tests, whichever occurs at the later date, shall, if so directed by EGAT, be corrected or replaced promptly by the Contractor at the expense of the Contractor.

In case of replacement of Equipment due to non-conformity with EGAT's specifications and/or defects found prior to acceptance of Equipment by EGAT or replenishment for short pack or returning of repaired Equipment due to such defect, the Contractor shall, upon receipt of EGAT's written notice supported with the receipt issued by the relevant parties, be responsible for reimbursement of the expenses incurred for the following :

- All re-export charges (if any)
- Import duty and taxes
- Landing charges, rents and handling charges (ocean freight)
- Storage charges (air freight)
- Truck hire
- Labour charges

These expenses shall exclude value added taxes, which will be EGAT's responsibility.

The contractor shall be also responsible for reimbursement of Service charges for customs clearance (if any) including value added tax.

Any latent defects not disclosed prior to the date of final payment or prior to acceptance or after completion of all tests, whichever occurs at the later date, but disclosed within the guarantee period as specified in Article F-10.a., shall be corrected or replaced promptly by the Contractor at the expense of the Contractor, except that the cost of import duty and taxes, inland transportation and installation of the replacement parts for foreign supply

Equipment, and the cost of inland transportation and the installation of the replacement parts for local supply Equipment will be borne by EGAT.

For Equipment specified in Data Sheet, in case EGAT, at its sole discretion, requires the Contractor to replace any defected Equipment, the Contractor shall replace the Equipment with the whole new set at its own costs and expenses including the cost of all re-export charges (if any), import duty and taxes, landing charges, rents and handling charges (ocean freight), storage charges (air freight), truck hire, labour charges, service charges for customs clearance, inland transportation and installation of the Equipment.

The Contractor shall extend the provisions of his liability to cover all repair and replacement parts furnished from the day immediately following the date of completion of such repair or replacement as follows:

Time of Malfunctioning and/or Defect Found	Guarantee Period Extension				
	Equipment with 1-Year guarantee period	Equipment with 2-Year guarantee period	Equipment with 3-Year guarantee period	Equipment with 4-Year guarantee period	Equipment with 5-Year guarantee period
First Year	For a new period of one (1) Year.	For a new period of two (2) Years.	For a new period of three (3) Years.	For a new period of four (4) Years.	For a new period of five (5) Years.
Second Year	n/a	For a new period of one (1) Year.	For a new period of two (2) Years.	For a new period of three (3) Years.	For a new period of four (4) Years.
Third Year	n/a	n/a	For a new period of one (1) Year.	For a new period of two (2) Years.	For a new period of three (3) Years.
Fourth Year	n/a	n/a	n/a	For a new period of one (1) Year.	For a new period of two (2) Years.
Fifth Year	n/a	n/a	n/a	n/a	For a new period of one (1) Year.

The Contractor shall, if required by EGAT in writing, search under the directions of EGAT for the cause of any defect, imperfection or fault appearing prior to the acceptance of Equipment or in the period of maintenance guarantee. Unless such defect, imperfection or fault shall be one for which the Contractor is liable under the Contract, the cost of the work carried out by the Contractor in searching as aforesaid shall be borne by EGAT. If such defect, imperfection or fault shall be one for which the Contractor is liable under the Contract, the cost of the work carried out in searching as aforesaid shall be borne by the Contractor and he shall in such case repair, rectify and make good such defect, imperfection or fault at his own expense.

E-30 Operation or Use of Unsatisfactory Equipment

If the operation or use of the Equipment proves to be unsatisfactory to EGAT, EGAT shall have the right to operate and use such Equipment until they can be taken out of service for correction by the Contractor of such latent defects, error, or omissions and for replacement in whole or in part, if correction is unsuccessful or infeasible. The period of such operation or use shall not exceed one (1) Year from the day immediately following the date of acceptance of Equipment by EGAT.

E-31. Dispute Resolution

Any dispute arising out of or in connection with this Contract, interpretation, breach, or termination thereof shall be settled by amicable discussion between authorized representatives of each Party. Either Party may at any time send a written notice to the other Party requesting for an appointment of authorized representative for a settlement of any dispute hereunder. The Parties agree to make diligent and good faith attempt to resolve such dispute in an equitable manner. If the authorized representatives of both Parties are unable to resolve such dispute within 30 Days after commencement of the discussion for dispute resolution or other extended period of time as mutually agreed by both Parties, either Party may file a lawsuit to the court having jurisdiction in Thailand for settlement of such dispute. Each Party agrees that the final court judgment shall be conclusive and binding upon the Parties.

Pending decision of the court, both Parties shall continue to perform their respective obligations under this Contract.

E-32. Language and Numbers

All drawings, designs, specifications, manuals, nameplates, markings, operating instructions, statements, schedules, notices, documents, and all written communications between EGAT and the Contractor, concerning this Contract, shall be in the English language and in the metric system of weights and measures unless otherwise specified.

DRAFT

SPECIMEN OF GUARANTEE

To :

Date

Electricity Generating Authority of Thailand
Bangkrui, Nonthaburi, 11130

Thailand

Re : Performance Security for Contract No. _____

Gentlemen :

In accordance with the provision of the Contract for _____ No. _____ (hereinafter referred to as the Contract) the contents of which have been noted by us that Messrs. _____ (hereinafter referred to as the Contractor) has to deposit with Electricity Generating Authority of Thailand (hereinafter referred to as EGAT) a Performance Security for the proper and faithful performance of the Contract in the amount of _____ (in words : _____) which is _____ per cent of the total Contract Price, we, the _____ as instructed by the Contractor, agree unconditionally to irrevocably guarantee as primary Obligor, the payment to EGAT on its first demand, without whatsoever right of objection on our part and without its first claim to the Contractor, in the amount not exceeding : _____ (in words : _____) in the event the obligations expressed in the above mentioned Contract have not been fulfilled by the Contractor, giving EGAT the right of claim for penalty, damages, liquidated damages or any expenses for which the Contractor may become liable to EGAT under the Contract.

We further agree that no extension of time, change in, addition to or other modification of terms of the Contract or Work to be performed thereunder, or of the Specifications or other Contract Documents, which may be made between EGAT and the Contractor, shall in any way release us from any liability under this guarantee, and we shall thereby waive notice of any such change, addition or modification.

This Performance Security shall be valid and remain in full effect from the date of execution of the Contract until the issuance of the Acceptance Certificate by EGAT or the acceptance of Equipment deemed to be made by EGAT against submission by the Contractor of the Maintenance Security accepted by EGAT.

Yours very truly,

Authorized Signature

Instructions for Packaging

Name of Equipment	Packed per complete set of one unit/units	Packed per Substation
1. Power Transformer	√(1)	-
2. Distribution Transformer	√(1)	-
3. Shunt Reactor	√(1)	-
4. Surge Arrester	√(1 or 3)	-
5. Current Transformer	√(1)	-
6. CC, CCVT, VT	√(1)	-
7. GIS	-	√
8. Shunt Capacitor Bank	-	√
9. Power Circuit Breaker	√(1)	-
10. Disconnecting Switch	-	√
11. AC/DC Dist. Board, LCUS, LRP	√(1)	-
12. Stationary Battery	√(1)	-
13. Lighting Fixture	-	√
14. Identification and Danger Notice Plate	-	√
15. Control and Protection System	√(1)*	-
16. Computerized Control System	-	√
17. Power Line Carrier	-	√
18. Teleprotection	-	√
19. Line Trap	-	√
20. Battery Charger	√(1)	-

- Note :**
1. Number in parenthesis represents maximum number of complete set of one unit/units packed in an individual package or crate.
 2. * In case of spare for control and protection system, such Equipment shall be packed per board, but in case of loose control and protection system, such Equipment of whichever substation shall be packed in the same package or crate of that substation.
 3. Other substation Equipment not mentioned shall be packaged in such a manner that it will not cause unreasonable expenses or delay to EGAT in distribution of such Equipment to the designated substation.
 4. Prior to delivery of all Equipment, packaging details shall be submitted to EGAT for approval.

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SECTION F
SPECIAL CONDITIONS

SPECIAL CONDITIONS

F-1. Scope of Work

The Contractor shall perform, furnish and deliver the Equipment as required by these Contract Documents.

For imported Equipment, Transportation from Thai Port to sites shall be EGAT's responsibility. However, the Contractor shall, at his own expenses and responsibility, perform unloading the Equipment at the port or airport of disembarkation in Thailand.

For local supply, Transportation from the Contractor's premises to the sites shall be EGAT's responsibility. However, the Contractor shall, at his own expenses and responsibility, perform loading the Equipment on EGAT's trucks or trailers at the Contractor's premises and shall be liable for all losses and/or damages to the Equipment as well as any expenses causing therefrom.

F-2. Responsibility of Contractor

The Contractor shall be solely responsible for ensuring that the Work throughout is executed in the most substantial, proper and workmanlike manner, with the best quality materials and conforming to the best engineering practice for the operating conditions specified; the drawings and quality control are performed or made in accordance with the Contract; and services reasonably to be furnished though not specifically provided in the Contract are furnished; all to EGAT's entire satisfaction notwithstanding that certain portions of the work may be executed by the Subcontractor.

F-3. Cooperation with Other Contractors

The Contractor, if required, shall exchange with other Contractor furnishing associated Equipment, all necessary drawings and other information required to insure the complete and proper design and manufacture of the Equipment to be furnished under these Specifications. One (1) copy of all drawings and correspondence, relating to information interchanged between Contractors, shall be sent to EGAT in Nonthaburi, Thailand.

***F-4. Supervision of Installation**

Subject to the desire and decision of EGAT, the Contractor may be required to furnish the services of qualified and experienced supervisor(s) who has at least three years experience on the particular Work required under the Contract and shall be the permanent employee of the manufacturer of the Equipment. For 230 kV (or lower) Power Circuit Breaker and 115 kV (or lower) Gas-Insulated Switchgear, the permanent employee of the representative of the manufacturer is acceptable, provided that such employee is certified by the manufacturer.

The scope of responsibility of the supervisor on behalf of the Contractor is as follows :

- a. Supervise and be responsible for the installation, erection, adjustment, field test and commissioning of the Equipment.
- b. Prepare formulation sheets for a check list, test sheet, release form and field report to be discussed with EGAT before performing the installation work.
- c. Submit four copies of report summarizing the work performance, from the beginning to the completion of the supervisory period, to EGAT within one month after finish the installation work or final inspection. The report shall include the following :
 1. Note on pending matter i.e. faulty and omitted equipment, performance deficiency etc.
 2. Problem concerning installation performance.
 3. Photographs showing progress of the installation work periodically until the work is completed.

The Contractor shall, in each and every instance, cooperate fully with the construction personnel installing and/or operating the Equipment and the Work, the operations of the supervisor shall be coordinated with the program of construction at the site as directed by EGAT.

The supervisor shall report at EGAT in Nonthaburi, Thailand, on the date designated by EGAT after a reasonable advance notice from EGAT, and shall remain until the Equipment have been in satisfactory operation for at least ten (10) working days as determined by EGAT, unless released earlier by EGAT.

The installation supervisor must be able to understand, speak, read and write the English language fluently. Should an interpreter be necessary, the cost of such interpretation service shall be at the Contractor's expense.

*If installation supervisor is required as specified in Price Schedule, this provision shall apply to this Contract.

F-5. Acceptance Tests

After the Equipment have been installed and placed in satisfactory operation, they may be tested by and at the expense of EGAT to determine whether or not all requirements of these Contract Documents have been met and the Contractor's guarantees have been fulfilled. The Contractor will be permitted to have his representative present at his own expense. If the tests show that the requirements or guarantee have not been met, the Contractor shall, at his own expense, make all necessary corrections. Additional tests will then be made to demonstrate to EGAT's satisfaction the effectiveness of these corrections. These additional tests will be at the Contractor's expense. Unless the necessary corrections have been made, the conditions of the Contract shall be considered unfulfilled.

All tests will be performed in accordance with the latest applicable Test Codes, unless otherwise stated.

F-6. Failure to Meet Performance Guarantees

If EGAT elects to accept the Equipment which do not meet any performance guarantee or which do not meet other requirements of these Contract Documents, as may be determined by factory test, field test or operation under service conditions, appropriate adjustment will be made of the Contract Price for such Equipment; provided that no such adjustment will be made until after the Contractor has been given a reasonable opportunity to repair, improve, or replace defective Equipment or parts thereof wherever practicable.

F-7. Acceptance Certificate

When EGAT is satisfied with the Equipment or agrees to accept the Equipment under the provision of Article F-6. Failure to Meet Performance Guarantees and there are no major unsettled claims against the Contractor by EGAT, EGAT will issue a written Acceptance Certificate against submission by the Contractor of maintenance security(ies) as specified in Article F-12. Maintenance Security and effective for a period of time as specified in Article F-10.a.

The Acceptance Certificate will list all deficiencies and reservations as a result of the inspection and tests performed, if any.

The purpose of the maintenance security is to guarantee the proper functioning of the Equipment supplied by the Contractor with a provision that the effective period of the maintenance security shall automatically be extended in case that the obligations stipulated in Article F-10. Maintenance Guarantee are not fulfilled.

A form of maintenance security acceptable to EGAT is shown in Article F-12. Maintenance Security.

F-8. Payment

Payment in foreign currency will be made in the currency or currencies in which the price has been stated in the price schedules. The Contractor has to inform EGAT the mode of payment he requires for payment for foreign currency portion together with detail of bank account No., beneficiary's name and address etc. *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.

In case the Contractor requires the payment of foreign currency portion to be made through letter of credit, EGAT will, if there is no fault or any delay caused by the Contractor, establish the letter of credit in the name of the Contractor or Suppliers not later than thirty (30) Days after signing the Contract. The Contractor shall be responsible for all bank charges inside and outside Thailand and including opening, amendment, reimbursing charges, payment commission, cable charges, discrepancy fee, acceptance commission and others (if any) arising from Letter of Credit.

Payment in local currency will be made directly by EGAT.

The Contractor or beneficiary has to inform EGAT by mailed letter or telex or facsimile *immediately the date upon which he has received the original letter of credit opened in his favour.*

Payment will be made in the following manner :

a. Payment for Equipment (except Spare Parts and Optional Items)

Foreign Supply

1. Eighty (80) per cent of the Contract Price will be paid after delivery FOB Port of Shipment (FOB Vessel) on the basis of pro rata value of each shipment against presentation of invoices, shipping documents, EGAT's letters of approval for shipment and EGAT's letter of approval for test report* of the relevant Equipment including EGAT's letter(s) of approval for final drawings only for Control and Protection Equipment.

***Test report means the report of tests specified in Article E-13. Inspection and Tests.**

2. Ten (10) per cent of the Contract Price of each Schedule will be paid against presentation of Drawing and Document Acceptance Certificate to be issued by EGAT to certify the receipt of all drawings and documents required from the Contractor under Article F-11. Drawings and Documents to be Furnished by Contractor for such schedule, provided that payment shall not be made until EGAT has received from the Contractor the original signed negotiable Bill of Lading and appertaining documents giving evidence of shipment of the main Equipment of that Schedule.
3. Ten (10) per cent of the Contract Price of each Schedule will be paid after the Equipment have been installed, tested and operated or used for a period of 30 Days and the acceptance of the said Equipment has been made by EGAT against presentation of Acceptance Certificate to be issued by EGAT and submission of maintenance security by the Contractor. EGAT will list the minor pending claim(s), if any, and payment will be made by deducting such claimed amount.

However, if, through no fault of the Contractor or of the Equipment, such installation, test and operation or use of the Equipment are delayed beyond a period of six (6) Months after complete delivery at Thai Port; payment of this ten (10) per cent will be made as soon as possible but not later than the ninth (9th) Month after complete delivery and it shall be deemed as if acceptance of Equipment is made by EGAT at the end of the said sixth (6th) Month and the guarantee period shall start therefrom against submission of maintenance security by the Contractor.

In case there is some minor claim(s) or minor fault of the Contractor, the payment of this ten (10) per cent shall be made by deducting such claimed amount and the guarantee period of this part will start after such minor claim(s) has been settled by the Contractor and acceptance of which has been made by EGAT.

Local Supply

1. Eighty (80) per cent of the Contract Price will be paid on the basis of pro rata value of each delivery against presentation of the Contractor's statement or delivery order confirming the *ex-works delivery* of Equipment duly certified by EGAT's representative*, EGAT's letters of approval for delivery and EGAT's letter of approval for test report** of the

relevant Equipment including EGAT's letter(s) of approval for final drawings only for Control and Protection Equipment.

*EGAT's representative means the authorized EGAT's Store personnel to verify the quantity of Equipment according to the packing list to be delivered to the Site.

**Test report means the report of tests specified in Article E-13. Inspection and Tests.

2. Ten (10) per cent of the Contract Price of each Schedule will be paid against presentation of Drawing and Document Acceptance Certificate to be issued by EGAT to certify the receipt of all drawings and documents required from the Contractor under Article F-11. Drawings and Documents to be Furnished by Contractor for such schedule, provided that payment shall not be made until EGAT has received from the Contractor the statement or delivery order and appertaining documents giving evidence of delivery of the main Equipment of that Schedule.
3. Ten (10) per cent of the Contract Price of each Schedule will be paid after the Equipment have been installed, tested and operated or used for a period of 30 Days and the acceptance of the said Equipment has been made by EGAT against presentation of Acceptance Certificate to be issued by EGAT and submission of maintenance security by the Contractor. EGAT will list the minor pending claim(s), if any, and payment will be made by deducting such claimed amount.

However, if, through no fault of the Contractor or of the Equipment, such installation, test and operation or use of the Equipment are delayed beyond a period of six (6) Months after complete ex-works delivery; payment of this ten (10) per cent will be made as soon as possible but not later than the ninth (9th) Month after complete delivery and it shall be deemed as if acceptance of Equipment is made by EGAT at the end of the said sixth (6th) Month and the guarantee period shall start therefrom against submission of maintenance security by the Contractor.

In case there is some minor claim(s) or minor fault of the Contractor, the payment of this ten (10) per cent shall be made by deducting such claimed amount and the guarantee period of this part will start after such minor claim(s) has been settled by the Contractor and acceptance of which has been made by EGAT.

b. Payment for Spare Parts

One hundred (100) per cent will be paid after complete delivery against presentation of invoices, shipping documents and EGAT's letter of approval for shipment for foreign supply or the Contractor's statement or delivery order confirming the delivery of Equipment ex-works duly certified by EGAT's representative* and EGAT's letter of approval for test report** of the relevant Equipment and the acceptance has been made by EGAT. The guarantee period shall start from the day immediately following the date of the acceptance of the Spare Parts.

*EGAT's representative means the authorized EGAT's Store personnel to verify the quantity of Equipment according to the packing list to be delivered to the site.

**Test report means the report of tests specified in Article E-13. Inspection and Tests.

c. Payment for Optional Items

Payment for Equipment

One hundred (100) per cent will be paid after complete delivery with presentation of invoices, shipping documents and EGAT's letter of approval for shipment and the acceptance has been made by EGAT. The guarantee period shall start from the day immediately following the date of the acceptance of Equipment.

Payment for Mechanical Operation Life Test (if any)

One hundred (100) per cent of the cost of the Mechanical Operation Life Test will be paid after the test has been performed successfully and test report has been accepted by EGAT.

d. Payment for Field Test Cost

One hundred (100) per cent of Field Test Cost will be paid after the test has been performed successfully and the test report has been accepted by EGAT.

e. Payment for Installation Supervisor

Payment for the services of the installation supervisor will be made within thirty (30) Days after his release by EGAT. Payment will be made on the basis of actual working man-days at the quoted cost per man-day up to a maximum equal to the total man-days quoted. For man-days exceeding the quoted total man-days, no payment shall be made by EGAT unless the Contractor can claim for any delays in

the progress of the work caused by EGAT. Any such additional man-days approved by EGAT shall be paid on the basis of the quoted man-day rate.

The number of quoted man-days shall include Sundays and shall cover a seven (7) day workweek, if required by the construction program. The working hours shall be forty-eight (48) hours per week, eight (8) hours per day, the working hours over 8 hours per day if requested by EGAT will be counted as overtime at 1½ times the regular hourly rate.

The amount to be paid for each Day for the services of the supervisor shall include for all salary, subsistence expense, insurance, compensations and personal expense of the supervisor, and all liabilities and responsibilities thereto. EGAT will pay for round-trip economy class air transportation for the installation supervisor between the Contractor's home office and Bangkok by the most expeditious and direct route on trip basis by draft after receipt of the Contractor's invoice supported with the used air ticket of such supervisor. The remission of immigration fees and taxes collectible by the Kingdom of Thailand shall not be paid by EGAT, as described in Article E-11. Fees and Duties.

F-9. Liquidated Damages for Late Delivery of Equipment

In the event of failure by the Contractor to make delivery of any Equipment within the time set forth in the Contract, plus any extension thereof authorized by EGAT as provided in the Contract, such failure shall be a default under the Contract for which the Contractor shall be liable for payment to EGAT as liquidated damages at the rate specified in Data Sheet.

Whenever any Equipment under any item is to be used together with other Equipment in other item as specified in Price Schedule as a complete set or unit, the Contractor shall make sure that they shall be shipped together as a complete set or unit. Failure on the part of the Contractor to comply with this requirement, the liquidated damages for late delivery of partial shipment shall be imposed on the Contractor for the whole amount of the Contract Price of such related items.

Notwithstanding, in case the Contractor fails to make delivery of minor part of any Equipment within the time set forth in the Contract and such late delivery does not have any effect to the performance of the Equipment, the Contractor shall be liable for payment to EGAT as liquidated damages at the rate of one-tenth of one (0.10) per cent of the total price of the minor part of the Equipment not timely delivered for each Day of delay. The price of such delayed minor part of the Equipment shall be determined by EGAT. EGAT shall, at his own discretion, determine whether such late delivery Equipment is the minor part and has any effect to the performance of the Equipment or not.

The payment of such liquidated damages shall not relieve the Contractor of his obligations to complete the Work under the Contract.

In case any Equipment is defective or does not conform to the requirements or specifications of the Contract where replenishment or correction or replacement must be made by the Contractor as per Article E-29. Failure to Meet Requirements, it shall be deemed that such Equipment has not yet been delivered unless such Equipment has been replenished or corrected or replaced, as the case may be, and delivered to EGAT at the delivery point specified in the Contract.

Payment of liquidated damages is contingent exclusively upon late delivery; in no case shall EGAT be required to substantiate any claim for payment of liquidated damages with proof of loss and/or damages. The liquidated damages shall be calculated for each Day of delay until the Equipment is delivered to EGAT excluding a period of time from the actual delivery date at the delivery point set forth in the Contract until the issuance of notification of defect or short pack or out of specification made by EGAT to the Contractor. This sum is payable regardless of the actual loss and/or damages incurred.

The Contractor shall not be liable for liquidated damages in the event of delay caused by force majeure.

F-10. Maintenance Guarantee

- a. The Contractor shall guarantee the proper functioning of the Equipment for a period as specified in Data Sheet from the day immediately following the date of acceptance of Equipment by EGAT; provided, however, that should any malfunctioning and/or latent defect in Equipment under normal use and service be found during the said period, and such malfunctioning and/or defective portion be repaired or replaced as stipulated in (c) and (d) hereinafter, then the guarantee period for such portion shall be extended from the day immediately following the date of completion of such repair or replacement as follows:

Time of Malfunctioning and/or Defect Found	Guarantee Period Extension				
	Equipment with 1-Year guarantee period	Equipment with 2-Year guarantee period	Equipment with 3-Year guarantee period	Equipment with 4-Year guarantee period	Equipment with 5-Year guarantee period
First Year	For a new period of one (1) Year.	For a new period of two (2) Years.	For a new period of three (3) Years.	For a new period of four (4) Years.	For a new period of five (5) Years.
Second Year	n/a	For a new period of one (1) Year.	For a new period of two (2) Years.	For a new period of three (3) Years.	For a new period of four (4) Years.
Third Year	n/a	n/a	For a new period of one (1) Year.	For a new period of two (2) Years.	For a new period of three (3) Years.
Fourth Year	n/a	n/a	n/a	For a new period of one (1) Year.	For a new period of two (2) Years.
Fifth Year	n/a	n/a	n/a	n/a	For a new period of one (1) Year.

The premium for the maintenance guarantee shall be paid by the Contractor.

- b. On the expiration of the maintenance guarantee period and if the Equipment is functioning normally, the Contractor shall thereafter be released of all obligations and responsibilities under the Contract and the maintenance security deposited in accordance with Article F-7. Acceptance Certificate, will be released and returned to the Contractor.
- c. If during the guarantee period EGAT finds any malfunctioning and/or defect in the Equipment, EGAT shall inform without delay the Contractor thereof, stating in writing the nature of the malfunctioning and/or defect, and the Contractor shall promptly commence to repair and make good or replace such malfunctioning and/or defect at the expense of the Contractor, except that the cost of import duty and taxes,

inland transportation and installation of the replacement parts for foreign supply Equipment, and the cost of inland transportation and the installation of the replacement parts for local supply Equipment will be borne by EGAT.

For Equipment specified in Data Sheet, in case EGAT, at its sole discretion, requires the Contractor to replace any defected Equipment, the Contractor shall replace the Equipment with the whole new set at its own costs and expenses including the cost of all re-export charges (if any), import duty and taxes, landing charges, rents and handling charges (ocean freight), storage charges (air freight), truck hire, labour charges, service charges for customs clearance, inland transportation and installation of the Equipment.

- d. If, after the repair or replacement performed in accordance with this Article, such Equipment continues to show malfunctioning and/or defect, EGAT may, at its option, demand further repair or replacement, and reserve the right to claim damages, if applicable, arising therefrom.
- e. If the Contractor fails to take action for starting up the necessary works for repair or replacement within fourteen (14) Days after receipt of EGAT's written notice of defect, the defect will be corrected by EGAT or any third party selected by EGAT at EGAT's discretion, and the cost of the corrections shall be on the responsibility and account of the Contractor.

In the event of an emergency where in the judgement of EGAT the delay resulting from giving formal notice would cause serious loss or damage which could be prevented by immediate action, defects may be corrected by EGAT or a third party chosen by EGAT without giving prior notice to the Contractor, and the cost of the corrections shall be paid by the Contractor. In the event such action is taken by EGAT, the Contractor will be notified promptly and shall assist wherever possible in making the necessary corrections.

F-11. Drawings and Documents to be Furnished by Contractor

The Contractor shall submit by registered airmail for foreign mail and registered mail for local mail with the drawings and other documents listed in the tables attached at the end of this Section.

After the requirement under this Article has been fulfilled by the Contractor, a Drawing and Document Acceptance Certificate will be issued by EGAT to certify the receipt of all required drawings and documents:

a. Drawings

- (1) Drawing Title and Sizes. The title of Contractor's drawing shall also include the followings :

ELECTRICITY GENERATING AUTHORITY OF THAILAND

EGAT's Contract No. _____

Item No. _____

Subs. Name _____

The sizes of the drawings except otherwise specified in the Specification shall be as follows :

<u>Size Designation</u>	<u>Dimensions in MM</u>	<u>Dimensions in Inches</u>
A0	841 x 1,189	(33.11 x 46.81)
A1	594 x 841	(23.39 x 33.11)
A2	420 x 594	(16.54 x 23.39)
A3	297 x 420	(11.69 x 16.54)
A4	210 x 297	(8.27 x 11.69)

- (2) Reference Drawings and Catalogues. General drawings showing principal dimensions and weights of Equipment, including controlling dimensions which affect space and handling requirements.

- (3) Drawings and Data for Approval. The Contractor shall submit for approval checked detail assembly drawings including firm dimensions, foundation details and setting diagrams, physical size and weights of all principal parts, complete operating characteristics and ratings of Equipment, connection and schematic wiring diagrams, descriptive information and any other information sufficient to demonstrate fully that the Equipment to be furnished will conform to the requirements and intent of these Contract Documents.

Schematic diagrams shall indicate the operation and function of all electrical Equipment, accompanied, where necessary, with explanatory notes. Wiring diagrams shall show the external connection required, sufficient for EGAT to complete interconnection cable diagrams.

One print each of the drawings submitted for approval will be returned to the Contractor by EGAT or its authorized representative within thirty (30) Days after receipt at EGAT's office, marked either "Approved",

"Approved Except as Noted", or "Returned for Correction"/"Not Reviewed". The notations "Approved" or "Approved Except as Noted" will authorize the Contractor to proceed with the manufacture of the Equipment covered by such drawing, subject to the correction, if any, indicated thereon. When prints of drawings have been "Returned for Correction"/"Not Reviewed", the Contractor shall make the necessary revisions on the drawings and shall within thirty (30) Days resubmit drawings for approval in the same manner as before.

Any manufacturing done before approval of the drawings will be at the Contractor's risk. EGAT shall have the right to require the Contractor to make any changes in the design which may be necessary, in the opinion of EGAT, to make the Equipment conform to the requirements and intent of these Contract Documents without additional cost to EGAT. Approval of the Contractor's drawings shall not be held to relieve the Contractor of any part of his obligation to meet all of the requirements of these Contract Documents or of the responsibility for the correctness of his drawings.

- (4) Reproducibles of all final approved drawings shall be made on mylar films.
- b. Report of Shop Test. The Contractor shall furnish certified copies of reports of all tests required of the manufacturer to show compliance with the applicable standards and specifications. The cost of all tests and reports shall be borne by the Contractor.
- c. Instruction Manuals. The Contractor shall furnish complete set of instruction manuals and all final approved drawings (if any) for erection, operation, maintenance and repair of the Equipment, and for identification of parts. The instruction manuals shall be combined, assembled and bound in binders. Each binder cover shall be stamped with proper identification indicating name of Equipment, manufacturer's name and address, EGAT's Contract number, manufacturer's reference, etc.

Prior to the assembly and submittal of the instruction manuals, a proof of the cover lettering and the table of contents shall be submitted in sufficient time for EGAT's acceptance without delaying submittal of the finished manuals.

The CD-ROM (Compact Disc-Read Only Memory) of final drawings, final documents, test report and instruction manual, if required, shall conform to the applicable International Standard Organization 9660 (ISO 9660) and have capacity of approximately 700 Mbytes.

The data in CD-ROM shall be created by the following software :

Drawing

The Contractor shall submit all drawings created by CAD software as follows:

1. MICROSTATION software Version SE or
2. AUTOCAD software Version 2000

Any necessary information supporting the completion of reading files (such as special font etc.) shall be included in CD-ROM.

Documents

The Contractor shall submit all documents in Adobe Portable Document Format File (PDF format) and also Program of Acrobat Reader in order to read the file completely in CD-ROM.

Drawing/Document List

The Contractor shall submit the drawings/documents listing information in work sheets file provided by EGAT in CD-ROM in Microsoft Excel file format.

Drawing list of design drawings, as built drawings, manufacturing drawings shall also be submitted together with the drawings in the CD-ROM.

F-12. Maintenance Security

The Contractor shall provide to EGAT prior to the issuance of the acceptance certificate and as a condition for the release of the payment of the last instalment as specified in Article F-8. Payment, maintenance security(ies) in the amount of ten (10) per cent of the total Contract Price or ten (10) per cent of each schedule, excluding the cost of installation supervisor and cost of test(s), guaranteeing the Contractor's performance of the provision of Article F-10. Maintenance Guarantee. The Contractor shall oblige himself to attend to and replace, during the period of maintenance, all malfunctioning parts and for repair of all defects noted in the Work and communicated to the Contractor in writing by EGAT. In case of extended guarantee of the repaired or replaced Equipment, the Contractor may request for return of the original maintenance security and submit a new maintenance security in the amount of ten (10) per cent of the Contract Price of Equipment under the extended guarantee.

The maintenance security shall be in the form of a cash deposit, *or a certified cheque issued by a local bank, or a cashier cheque issued by a local bank*, or a bank guarantee or letter of guarantee issued only by a local bank or an acceptable financial institution in Thailand, or by a foreign bank counter-guaranteed by a local bank, and made payable to EGAT in the same currency as that of the Contract. In case of a cash deposit, only Thai baht portion of the Contract Price can be made. EGAT may at its absolute discretion

refuse to approve any maintenance security offered or may at any time, upon application by the Contractor, approve of the substitution for any maintenance security held under this Article by other maintenance security on such terms and conditions as may be approved by EGAT.

The conditions of guarantor's obligations in the maintenance security shall include, inter alia; the following :

1. The guarantor shall unconditionally guarantee, as primary obligor and not as surety merely, payment of any obligations, damages, liquidated damages, performance penalties, or expenses for which the Contractor may become liable to EGAT.
2. No extension of time, change in, addition to, or other modification of the terms of the Contract or Work to be performed thereunder, or of the Specifications or other Contract Documents shall in anyway release the guarantor from any liability under the maintenance security, and the guarantor shall thereby waive notice of any such extension of time, change, addition or modification.
3. The maintenance security shall be valid and remain in full effect from the date of acceptance of Work until all obligations on the part of the Contractor under the Contract have been fulfilled.

Unless and until an official receipt is issued in respect to a maintenance security deposit, EGAT will not recognize or accept any such deposit as fulfilling the requirements of this Article. Failure to deposit a maintenance security at the time specified above in this Article or such extended time as may be approved by EGAT shall be a breach of this Contract and EGAT may, at its discretion, retain the payment of the last instalment of the total Contract Price.

If any maintenance security furnished under this Article shall become unacceptable to EGAT, or if any guarantor shall fail to furnish reports as to guarantor's financial condition from time to time, as requested by EGAT, the Contractor shall promptly furnish such additional or alternative maintenance security as may be necessary to satisfy the Contract requirements for a maintenance security.

In the event of any default or breach of this Contract on the part of the Contractor, EGAT may convert into money any maintenance security which does not consist of money, and the proceeds shall be deemed to be a cash deposit under this Article. EGAT shall not be liable for any cost, expenses and/or loss resulting from the conversion of any maintenance security deposit into money as herein provided. The Contractor shall bear the cost of the maintenance security.

The maintenance security, in case of a bank guarantee, or letter of guarantee, shall be in conformity with the following specimen.

SPECIMEN OF MAINTENANCE GUARANTEE

To :

Date :

Electricity Generating Authority of Thailand
Bangkrui, Nonthaburi 11130
Thailand

Re : Maintenance Security for Contract
No. EGAT _____

Gentlemen :

In accordance with the provision of the Contract for _____ No. EGAT _____ dated _____ (hereinafter referred to as the Contract), the contents of which have been noted by us that Messrs. _____ (hereinafter referred to as the Contractor) has to deposit with Electricity Generating Authority of Thailand, (hereinafter referred to as EGAT) a Maintenance Security to guarantee the proper functioning of the _____ of the Contract as specified in Article F-10. Maintenance Guarantee in the amount of _____ (in words : _____) which is equivalent to ten (10) per cent of the total Contract Price or ten (10) per cent of each schedule of the said Work, excluding the cost of installation supervisor and cost of test(s), we, the _____ as instructed by the Contractor, agree unconditionally to irrevocably guarantee as primary Obligor, the payment to EGAT at its first demand, without whatsoever right of objection on our part and without its first claim with the Contractor giving EGAT the right of claim for penalty, damages, liquidated damages or any expenses for which the Contractor may become liable to EGAT under the Contract.

We further agree that no extension of time, change in, addition to or other modification of terms of the Contract or work to be performed thereunder, or of the Specifications or other Contract Documents, which may be made between EGAT and the Contractor, shall in any way release us from any liability under the Maintenance Security, and we shall thereby waive notice of any such extension of time, change, addition or modification.

This Maintenance Security shall be valid and remain in full effect for a period of _____ (...) Year(s) from the day immediately following the date of the acceptance of Equipment. If necessary, this Maintenance Security shall be extended as specified in Article F-10. Maintenance Guarantee.

Yours very truly,

Authorized Signature

Drawings and Documents to be Furnished by the Contractor
(For Control and Protection Equipment)

The Contractor shall submit by registered mail with the drawings and other documents listed below by the designated deadlines :

Drawings/Documents	No. of copies		Deadline and Remarks
	P	CD-ROM	
Manufacturing and Delivery Schedule	2	-	Within 60 Days after receipt of Notice of Award of Contract
Quality Assurance Program (If requested by EGAT)	2	-	Within 60 Days after receipt of Notice of Award of Contract
Drawings or Documents "RELAY AND EQUIPMENT INSTRUCTION MANUAL"	1	-	Within 90 Days after receipt of Notice of Award of Contract
Drawings or Documents "FOR APPROVAL"	2	-	Within 90 Days after receipt of Notice of Award of Contract
Drawings or Documents "FOR REAPPROVAL"	2	-	Within 30 Days after receipt of returned approval drawings for correction
Drawings "DRAFT-FINAL DRAWING"	2	-	Within 30 Days for P and 60 Days for CD-ROM after receipt of returned approved drawings
Drawings and Documents "FINAL DRAWING or FINAL DOCUMENT"	2	1	Within 20 Days after Equipment delivery
Test Procedure (Factory Test)	2	-	Within 90 Days after receipt of Notice of Award of Contract
Test Schedule (Factory Test)	2	-	Not less than 60 Days before testing for foreign supply Not less than 30 Days before testing for local supply
Test Report (Factory Test)	2	-	Upon completion of tests
Instruction Manuals	3	3	30 Days before first shipment/delivery

Note :
P = Print Drawing or Document
CD-ROM = Compact Disc-Read Only Memory with capacity of approximate 700 Mbytes conforming to ISO 9660

Drawings and Documents to be Furnished by the Contractor
(For All Equipment except Control and Protection Equipment)

The Contractor shall submit by registered mail with the drawings and other documents listed below by the designated deadlines :

Drawings/Documents	No. of copies		Deadline and Remarks
	P	CD-ROM	
Manufacturing and Delivery Schedule	4	-	Within 60 Days after receipt of Notice of Award of Contract
Quality Assurance Program (If requested by EGAT)	2	-	Within 60 Days after receipt of Notice of Award of Contract
Drawings or Documents "FOR REFERENCE"	4	-	Within 90 Days after receipt of Notice of Award of Contract
Drawings or Documents "FOR APPROVAL"	4	-	Within 60 Days for foundation, steel supporting structure (if any) and within 90 Days for others after receipt of Notice of Award of Contract
Drawings or Documents "FOR REAPPROVAL"	4	-	Within 30 Days after receipt of returned approval drawings for correction
Drawings and Documents "FINAL DRAWING or FINAL DOCUMENT"	4	-	Within 30 Days after receipt of approved drawings
Final Design Data	4	-	Within 150 Days after receipt of Notice of Award of Contract
Test Procedure (Factory Test)	2	-	Within 150 Days after receipt of Notice of Award of Contract
Test Schedule (Factory Test)	2	-	Not less than 60 Days before testing for foreign supply Not less than 30 Days before testing for local supply
Test Report (Factory Test)	4	4*	Upon completion of tests
Installation Instruction	10	4*	60 Days before first shipment/delivery
Instruction Manuals	10	4*	Before shipment/delivery

Note : P = Print Drawing or Document
 CD-ROM = Compact Disc-Read Only Memory with capacity of approximate 700 Mbytes conforming to ISO 9660

*CD-ROM of Test Report (Factory Test), Installation Instruction and Instruction Manuals may be created in the same disc.

DRAFT

SECTION G
RATINGS AND FEATURES

G. RATINGS AND FEATURES

G -1. Ratings and Features

The following Ratings and Features sheets are attached hereto and made a part of the Contract Documents:

<u>RF No.</u>	<u>Description</u>	<u>Page</u>
RX9411	Shunt Reactor	G2
RX7712	Neutral Reactor	G3-G4
SA7D01	Surge Arrester	G5

DRAFT

**Shunt Reactor
Specification No. 382**



**Substation Electrical
Equipment Engineering Department**

Ratings and Features	Designed : ၇၁၅၇၀၄	Validated :	Revision 3	Page 1/1
RF No. RX9411	Verified : ၇၁၅၇၀၄	Approved :	Dated : 18.11.15	

a. Type / Type of Cooling	3-phase, Oil Filled, Outdoor / OA	
b. Rated Frequency	50	Hz
c. Nominal System Voltage	525	kV
d. Max. Continuous System Voltage	550	kV
e. Rated Capacity (3-Phase at Rated Voltage)	55	MVAR
f. Winding Voltage Rating		
- Rated Voltage (High Voltage)	525	kV
- Rated Voltage (Neutral)	138	kV
- BIL (High Voltage)	1,550	kV
- BIL (Neutral)	650	kV
- Switching Surge (High Voltage)	1,175	kV
g. Bushing Voltage Rating		
- Rated Voltage (High Voltage)	525	kV
- Rated Voltage (Neutral)	138	kV
- BIL (High Voltage)	1,550	kV
- BIL (Neutral)	650	kV
- Switching Surge, Wet (High Voltage)	1,175	kV
h. Bushing Creepage Distance		
- High Voltage	≥ 12,650	mm
- Neutral	≥ 2,760	mm
i. Connection	Ground Wye	
j. Audible Noise Level (Internal noise only without external accessories such as sound panels, sound enclosure, dampers, sound absorbers etc.)	≤ 74	dB(A)
k. X0/X1 Ratio of Phase Reactor	1.0	
l. Temperature Class of Winding Insulation	120	
m. Winding Temperature Rise (Continuous at 105% Rated Voltage and Rated Frequency)		
- Average / Hottest Spot	≤ 60 / ≤ 75 °C	
n. Current Transformer		
High Voltage Terminal		
- Qty. per Phase	3	
- Accuracy Class	C1000	
- Continuous Thermal Current Rating Factor	1.0	
- Ratio	50/100/150/200/250/300/400/450/ 500/600 : 1 A	
Neutral Terminal		
- Qty. per Phase	2	
- Accuracy Class	C1000	
- Continuous Thermal Current Rating Factor	1.0	
- Ratio	50/100/150/200/250/300/400/450/ 500/600 : 1 A	
o. Max. Permissible Shipping Weight	120 tons	
p. Max. Permissible Shipping Dimension (W × L × H)	3.5 m × 8.0 m × 4.0 m (See Note 1)	
q. Applicable Standard	IEEE C57.21	

- Note : 1. Exception to the weight and dimension limitation stated in Article : Clearance and Weight Limitations of Section E : General Conditions of Contract.
2. Radiators shall be designed to be attached to the reactor tank, The radiator bank located on separated foundation from the reactor foundation is not acceptable.

Neutral Reactor
Specification No. 382



Substation Electrical
Equipment Engineering Department

Ratings and Features	Designed : 23/10/07	Validated : [Signature]	Revision 3	Page 1/2
RF No. RX7712	Verified : [Signature]	Approved : [Signature]	Dated : 13 Oct. 09	

a. Type / Type of Cooling	Single Phase, Oil Filled, Outdoor / OA	
b. Rated Frequency	50	Hz
c. Rated Capacity	0.55	MVAR
d. Current Rating		
- Continuous	16.5	A
- 10 Minutes	55	A
e. Winding Voltage Rating		
- Rated Voltage (High Voltage)	110	kV
- Rated Voltage (Neutral)	15	kV
- BIL (High Voltage)	650	kV
- BIL (Neutral)	110	kV
- Switching Surge (High Voltage)	-	kV
f. Bushing Voltage Rating		
- Rated Voltage (High Voltage)	110	kV
- Rated Voltage (Neutral)	15	kV
- BIL (High Voltage)	650	kV
- BIL (Neutral)	110	kV
- Switching Surge, Wet (High Voltage)	-	kV
g. Bushing Creepage Distance		
- High Voltage	≥ 2,760	mm
- Neutral	≥ 280	mm
h. Audible Noise Level (Internal noise only without external accessories such as sound panels, sound enclosure, dampers, sound absorbers etc.)	≤ 55	dB(A)
i. Neutral Reactor Zero Sequence Reactance (Xn)	2,000	ohms
j. Temperature Class of Winding Insulation	120	
k. Winding Temperature Rise (Continuous at 105 % Rated Voltage and Rated Frequency)		
- Average / Hottest Spot	≤ 60 / ≤ 75	°C
l. Current Transformers		
High Voltage Terminal		
- Qty. per Phase	1	
- Accuracy Class	C1000	
- Continuous Thermal Current Rating Factor	1.0	
- Ratio	50/100/150/200/250/300/400/450/500/600 : 1 A	
Neutral Terminal		
- Qty. per Phase	1	
- Accuracy Class	C1000	
- Continuous Thermal Current Rating Factor	1.0	
- Ratio	50/100/150/200/250/300/400/450/500/600 : 1 A	
m. Surge Arrester, Station Class, Tank Mounted on High Voltage Side (RF SA7D01)		
- Qty. per unit	1	
- Voltage Rating	120	kV

**Neutral Reactor
Specification No. 382**



**Substation Electrical
Equipment Engineering Department**

Ratings and Features	Designed : <i>QSNM</i>	Validated : <i>[Signature]</i>	Revision 3	Page 2/2
RF No. RX7712	Verified : <i>[Signature]</i>	Approved : <i>[Signature]</i>	Dated : <i>13 Jul 59</i>	

- n. Max. Permissible Shipping Dimension (W×L×H) 3.5 m × 8.0 m × 4.0 m (See Note 1)
o. Applicable Standard ANSI/IEEE Std. 32

- Note : 1. Exception to the weight and dimension limitation stated in Article : Clearance and Weight Limitations of Section E : General Conditions of Contract.
2. The shunt reactor and neutral reactor shall be proposed from the same factory.

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Surge Arrester
Specification No. 393 or 1001



Substation Electrical
Equipment Engineering Department

Ratings and Features	Designed : <i>imã</i>	Validated : <i>[Signature]</i>	Revision 2	Page 1/1
RF No. SA7D01	Verified : <i>[Signature]</i>	Approved : <i>[Signature]</i>	Dated : /4 2020	

a. Type	Metal Oxide, Outdoor
b. Class	Station Class
c. Rated Frequency	50 Hz
d. Nominal System Voltage	115 kV
e. Max. Continuous System Voltage	121 kV
f. Insulation Level (BIL) of Insulator	550 kV
g. Arrester Voltage Rating	120 kVrms
h. Duty Cycle Test Current	10 kA
i. One-minute Energy Absorption Capability at 45°C Ambient and Max. System L-G Voltage	≥ 4 kJ/kV
j. Creepage Distance of Insulator	≥ 3048 mm
k. Line Terminals	4" 4-Hole NEMA Pad
l. Mounting	Pedestal
m. Applicable Standard	IEEE Std C62.11

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SECTION I
SPECIFICATIONS

I. SPECIFICATIONS

I-1. Specifications

The following specifications are attached hereto and made a part of the Contract Documents :

<u>Specification No.</u>	<u>Description</u>	<u>Page</u>
382 (Mar 2019)	500 kV Shunt Reactor	382.1 – 382.24
	Drawing No. RX-TSD-01 (Rev.2)	1
393 (Jul. 96)	Metal Oxide Surge Arresters	393.1 – 393.9

established and approved in the country of equipment or material manufacturer may be used subject to EGAT's approval. If this election is made, the Bidder shall so state and include in his bid the governing codes, specifications, and standards proposed together with an itemized list of specific deviations from the requirements of codes, specifications and standards referenced herein.

The latest issue of all codes, specifications and standards shall govern.

The most stringent requirement, in the event of code, specification or standard conflict, shall govern. This specification shall govern in the event of discrepancies between it and applicable codes, specifications and standards.

382-5 Working Stresses - *The design of all components, particularly those subject to shock or stress reversal, shall incorporate reasonable factors of safety in all cases.*

382-6 Reactor Requirements. The phase and neutral shunt reactors required shall meet the requirements described herein and on the Ratings and Features sheet.

Winding conductor shall be free from burrs, scale and splinters and shall be uniformly insulated. In every case, each conductor strand shall be insulated by varnish to avoid the risk of sulfur attack in contact with insulating oil. Bare conductor (without the enamel) is not acceptable.

All insulation shall be of inform quality and void free. Current carrying joints or splices shall be welded or braced, properly formed and finished and insulated for the basic insulation level.

6.1 Phase Reactor. The phase reactor shall be furnished utilizing a three phase design placing all three phases within a single tank. The neutral side of the main winding for each phase shall be brought out of the tank through an insulating bushing. The neutral connection shall be made externally.

6.2 Neutral Reactor. A neutral reactor shall also be furnished when it is required for use with the phase reactor to facilitate high speed single pole reclosing of the transmission line.

6.3 Impedance Characteristic. The phase and neutral reactors shall be furnished with the impedance characteristics described below. Impedance characteristic curves shall be furnished for each reactor.

6.3.1 Tolerance. The impedance tolerance shall be within $\pm 5\%$ of the specified value.

6.3.2 Phase Reactor Tolerance Between Phases. The impedance of any one phase shall be within $\pm 2\%$ of the average impedance of the three phases.

6.3.3 Phase Reactor Linearity. The impedance characteristic of the phase reactor shall be linear with up to 125 % of rated voltage applied.

The slope of the impedance characteristic with 125 % to 150 % of rated voltage applied shall not be less than one third that with zero to 125 % of rated voltage applied.

6.3.4 Phase Reactor Zero Sequence Impedance. The ratio of the zero sequence impedance to the positive sequence impedance of the phase reactor (X0/X1) shall be within the range specified on the Ratings and Features sheet in order to permit successful single pole reclosing of the power circuit breakers.

6.3.5 Neutral Reactor Impedance. The impedance of the neutral reactor shall be linear for voltages from zero to the 10s short time overvoltage rating of 1.4 x rated voltage applied. The neutral reactor impedance is dependent on the impedance and the X0/X1 ratio of the phase reactor. After the manufacturer has determined the X0/X1 ratio of the phase reactor, the impedance of the neutral reactor shall be selected as specified on the Ratings and Features sheet.

6.4 Tank. *Each reactor shall be provided with a steel case of substantial construction and a welded main cover. The tank shall be capable of withstanding, without leakage or permanent distortion of an internal gas pressure of 1 kg/cm² (14.22 lb/in²) and a vacuum of 760 mm of mercury and shall be designed and constructed for full vacuum filling in the field. The maximum design positive and negative operating pressures shall be indicated on the nameplate. All valves, fittings and piping shall be designed and constructed for such vacuum filling.*

The tank shall also have suitable jacking pads, pulling eyes and lifting lugs. All the jacking pads, pulling eyes and skid base shall be designed and constructed for possibly moving the complete assembly reactor on roller in either direction. The jacking pads shall be located at the tank side wall of at least 40 cm above reactor base and shall be suitable for EGAT's jack having base dimension of 30 cm x 25 cm in rectangular. The tank shall be provided with a fabricated structural steel skid base to allow skidding or moving on roller in either direction. The tank shall have four (4) jacking pads for applying force at the same time. The base and skids for shunt reactor shall be fabricated as one piece with the distance between skids shall be in the range of 120 to 150 cm (center to center). A flat base plate is not acceptable.

The position of center of gravity for reactor under transportation condition and complete assembly condition shall be clearly marked on the reactor tank, the axes of center of gravity for both conditions shall be marked at skid base of all four sides of reactor. The distance between center of gravity under transportation condition and the center line of reactor shall not be more than 150 mm.

- 6.5 Winding Temperature Rise.** The phase and neutral reactors shall be furnished with the temperature rise limits of 60°C for the winding temperature by resistance and 75°C for the hottest spot winding temperature rise over ambient temperature. The reactors shall be designed to meet the winding temperature rise limits for continuous operation with 105 % rated voltage and rated frequency applied and when subjected to the specified over excitation conditions.
- 6.6 Cooling.** The phase and neutral reactors shall be air cooled, oil- immersed type. The temperature rise requirements shall be met with self-cooling (class *ONAN*) operation.
- 6.7 Oil System.** The phase and neutral reactors shall be oil immersed with a conservator type oil preservation system. The conservator, radiators and main tank shall each be furnished with their own filling, draining and filtering devices.
- 6.7.1 Conservator.** A rubber bag type conservator shall be furnished to prevent direct contact between the outside air and the oil inside the reactor conservator. The conservator take shall be capable of withstanding without leakage or distortion an internal pressure of 1 kg/cm² and a vacuum of 760 mm of mercury. The tank design and construction shall permit field vacuum filling.

The conservator shall be equipped with the devices as follows:

- a. Combination of oil fill, oil filter and vacuum valve.
- b. Oil drain valve with flange connection complete with blank cover plate and gasket.
- c. Dehydrating breather assembly to absorb moisture and remove contaminants from the air which is drawn into the conservator air space. A desiccant shall be used which changes color as it absorbs moisture and can be viewed through a glass window. The breather and valve shall be located close to ground level for ease in maintenance. *The silica gel shall be nontoxic type.*
- d. Isolation valve between the main tank oil and the conservator oil permitting isolation of the conservator from the main tank.
- e. Liquid level gage that can be viewed from ground level. Alarm contacts shall be furnished for annunciation.
- f. Air detector relay with alarm contact outputs that can be used to provide an alarm in the event of rubber bag failure if air is allowed to come into contact with the conservator oil.
- g. Lifting eyes for installation and removal.
- h. Connecting valve for evacuation.

6.7.2 Radiators. Radiators shall be furnished consisting of input and output headers and individual cooling units. Machined faced, drilled flanges shall be welded to the main tank, headers and radiator cooling units. These flanges shall be designed for making bolted, gasket connections between units. The cooling units shall be of corrosion resistant metal and shall be designed to permit individual replacement. Indicating shut-off valves, having no gasket joints between the valves and the reactor tank, shall be provided at each reactor inlet and outlet connection to permit removal of any radiator without de-energizing the reactor. Each radiator shall be furnished with a flanged oil drain valve, and a combination of vacuum-bleeder valve and lifting eyes. The radiators shall be designed and constructed for independent vacuum filling in the field. *Each radiator shall be of galvanized with painted.*

6.7.3 Pressure Relief Device. A self-reset type pressure relief device shall be provided to prevent excessive pressures from building up inside the tank which could cause equipment damage. The pressure relief device shall automatically reset following an operation and shall be furnished with a semaphore or other visible indicator of an operation of the device, visible from ground level. It shall have trip contacts to provide indication of an operation of the device.

6.7.4 Insulating Oil. The oil furnished shall be new, unused mineral oil with oxidation inhibitor additive, shall meet the requirement of ANSI/ASTM D3487 and shall be compatible with the oil used in the reactor during testing. The furnished oil shall be able to mix the ESSO UNIVOLT NG1 mineral oil without degradation of characteristics of the furnished oil and the amount furnished shall be sufficient for actual filling at site. All insulating oil shall be shipped in non-returnable steel drums which shall become EGAT property.

The property of the insulating oil shall be non-corrosive in accordance with the test preparation and procedure under ASTM D1275, and classification of the non-corrosiveness shall be 1a or 1b as listed in Table 1 of ASTM D130. The non-corrosiveness of the insulating oil shall not be deterioration. The insulating oil with passivator or other additives is not accepted, except for oxidation inhibitor as stipulated in the ASTM standard.

In addition to the above requirement, the actual test to verify all properties referred in latest ASTM D3487 shall be performed on the insulating oil being supplied under this Contact. The certified test report shall also be submitted and attached to the reactor test report.

6.7.5 Oil Temperature. The top-oil temperature rise measured at the top of the main tank shall not exceed 60°C over ambient temperature.

- 6.8 Gas Venting.** Piping shall be arranged to have a slope of not less than 0.05 radians (2.86 degrees) from the horizontal and shall be upward toward the conservator. The highest point of every pocket in the tank and attachments in which gas may accumulate shall be connected together by piping and shall be connected through the buchholz relay. *Valves with flange shall be provided for both sides of relay.*
- 6.9 Overexcitation.** The phase and neutral reactors shall withstand the overexcitation requirements listed below without exceeding the specified permissible temperature rises.
- a) 1.05 x rated voltage at 50 Hz, continuously.
 - b) 1.25 x rated voltage at 50 Hz, for 60 s.
 - c) 1.40 x rated voltage at 50 Hz, for 10 s.
 - d) 1.00 x rated voltage at 48Hz, continuously.
- 6.10 Noise and Vibration.** The reactor and its accessories shall be designed, manufactured and assembled so as to minimize and withstand without damage the inherent vibration that occurs during transportation. Neither shipping vibration nor vibration occurring during normal operation shall reduce the expected life of the reactor assemblies. The measured natural frequency of the reactor shall be recorded in the test reports. The third harmonic component of the reactor current shall not exceed three percent of the fundamental when the reactor is energized at rated voltage with a sinusoidal wave form.
- a. An additional consideration shall be the relation of levels of tank stress and vibration to temperature. The tank shall be constructed to withstand any mechanical stress leading to fatigue fracture resulting from operation between expected minimum and maximum ambient.
 - b. Tank construction shall be such that strain gauges may be mounted on or connected to the magnetic circuits with leads being brought out to external housings, so that vibrations may be measured at selected positions on the reactor tank or cover utilizing the strain gauges attached thereto.
 - c. The peak-to-peak vibration amplitude shall not exceed 100 microns as measured at any point on the tank walls or cover, or 30 microns at any point on the tank bottom, while the reactor is operating at maximum rated voltage.
 - d. The vibrational stresses at any point on the tank walls or cover, based on actual measurements or calculations, shall not exceed 2800 psi (20,000 kPa).
 - e. Reactor noise level with all auxiliaries in operation shall not exceed the values specified in the Ratings and Features Sheet when tested in accordance with IEEE C57.21.

6.11 Short Circuit Capability. *The neutral reactor shall be designed and constructed to withstand the mechanical stress produced by external short circuit. The short circuit current shall be according to IEEE C57.32.*

6.12 Bushings. *All bushing shall be resin-impregnated paper-insulated bushing for capacitance graded bushing and solid for non-capacitance graded bushing. For resin-impregnated paper-insulated bushing, the inner space between insulator and condenser body, if any, must not be filled with oil or gas. The material, electrical and mechanical characteristics shall comply with the applicable requirements of the latest IEEE C57.19. The capacitance graded bushing shall be equipped with capacitance test tap.*

All porcelain used in bushing shall be wet process, homogeneous, and free from cavities or other flaws. The glazing shall be uniform in color and free from blisters, burns and other defects. The color of all porcelain insulators shall be chocolate brown. All porcelain parts of 230 kV and below bushing shall be one piece.

The porcelain housing for 69 kV and above bushing shall be cemented to the flange.

All bushings shall be mounted so that their installation and removal may be accomplished without draining the oil below the top of the windings. The phase spacing between any bushings shall not be less than 800 mm.

For bushings supply as spare part, the package for long term storage shall be provided.

6.13 Terminal Pad. *Each equipment terminal for connecting to the line or other equipment shall be equipped with a suitable terminal pad unless otherwise specified. The terminal pad shall be provided with four 14.3 mm (9/16 inch) diameter holes with a 45 mm (1-3/4 inch) spacing between the centers of each hole in accordance with the NEMA Standards CC1, 4 holes arrangement. Whenever the larger terminal pads are required for higher current rating, the mounting holes shall conform to NEMA Standards CC1, and details of the mounting holes shall be submitted for approval.*

The terminal pad shall be of high conductivity copper or aluminum alloy and shall be plated with hot flow electro-tinned to a thickness of not less than 0.0127 mm (0.0005 inch).

The terminal pad on the phase reactor middle neutral bushing shall be suitable for accepting three NEMA standards 4 hole pad terminal connectors (for making connections between neutral bushings and ground or a neutral reactor).

Each high voltage bushing shall have a stud type top terminal with UNF-2A threads and with finish suitable for using with an aluminum alloy connector.

6.14 Current Transformers (CT). Multi-ratio current transformers, which meet all of IEEE C57.13 requirements, shall be furnished with the phase reactor and with the neutral reactor. The number of current transformers ratings and features required are specified on the Ratings and Features sheet.

6.14.1 CT Type and Location. The current transformers located on both the high voltage side and on the neutral side of the reactor windings shall be multi-ratio bushing type and mounted external to the main tank in weatherproof enclosures so that maintenance or replacement can be performed without draining oil from the reactor.

6.14.2 Secondary Wiring. The wiring from the secondary of each current transformer shall be routed to the control cabinet in metal conduit. The secondary wiring shall be terminated in the control cabinet on short circuiting type terminal blocks. The terminal blocks shall be molded with insulating barriers, *ring tongue crimped* type terminals and white marking strips. The current transformer ratio shall be selectable and marked on the white marking strips at the terminating terminal blocks.

382-7 Surge Arrester. The reactor shall be provided with a surge arrester and an associated discharge counter as specified on the Ratings and Features sheet. When possible, the height of the arrester terminals shall approximately match the height of the associated bushing. A discharge counter shall be mounted approximately 1.5 m above the base of the reactor. The surge arrester and associated discharge counter furnished shall be in accordance with the EGAT surge arrester specification.

382-8 Accessories. Each phase and neutral reactor shall be furnished *complete* with, *but not limited to*, the accessories listed below. All auxiliary relays and switches shall be for use in 125 V DC control schemes. Electrically independent, dry contacts shall be provided with all devices for local annunciation, remote annunciation and sequence of events, recording.

8.1 Oil Level Indicator. A dial type liquid level *gauge with high and low-level alarm contact* shall be furnished to monitor the reactor conservator oil level. The *gauge* shall be located for ease in reading from ground level at the reactor tank. An output switch with output contacts shall be provided for annunciation. The relay shall include normally open contacts which shall be factory set to close when the oil level drops to an undesirable level.

8.2 Oil Temperature Indicator. A dial type thermometer with the *dial* range of 0-150°C and alarm contact to close on high *oil* temperature shall be furnished to monitor the reactor oil temperature. The *gauge* shall be located for ease in reading from ground level at the reactor tank.

8.3 Winding Temperature Relay. A *winding hot-spot temperature detector of the Platinum resistance type 100 ohms (PT-100) at 0°C, shall be furnished together with necessary accessories, arranged for remote indication for use with a temperature recorder which will be provided and mounted on a switchboard by the others. The heater for the detector shall be connected to the secondary of a current transformer winding, and shall be located in the oil near the top of the*

reactor. A dial type meter with the range of 0-160°C shall be furnished for winding temperature indication at the reactor tank. Two separately adjustable output switches shall be furnished, one for annunciation and the other for energizing a lockout relay. Each output switch shall be adjustable with ungrounded contact. One switch shall be factory set for a contact closure at not more than 110°C for alarm stage 1 purposes and the other switch for a contact closure at not more than 115°C for alarm stage 2 purposes. The contacts shall open when the temperature drops 5°C below the closing setting. Each switch shall contain at least two electrically separate contacts.

8.4 Buchholz Relay. A Buchholz relay shall be furnished which will provide fault pressure and gas detecting features. The Buchholz relay shall be furnished with two contact outputs, one for alarm and the other for trip. *Valves with flange shall be provided for both sides of relay.*

8.5 Auxiliary and Lockout Relay. Auxiliary and lockout relays shall be furnished for use in the reactor protection scheme. The lockout relay shall be of the mechanically latched-in type and shall be a manually reset device operable by means of a red oval handle. The relay shall be rated for 125 V DC and operate correctly with 70-140 V DC applied. The lockout relay shall operate in less than 20 ms with rated voltage applied. A target shall be provided to indicate what position the lockout relay is in. The relay shall be rated to withstand seismic ZPA forces of 10g with input motions between 4 and 16 Hz and 4g with input motions above 33 Hz, when tested according to IEEE standards IEEE C37.98 and IEEE- STD-344. No misoperations shall occur. The insulation shall be rated for 100 megohms when tested with a 500 V DC tester for one minute. The lockout relay shall be rated for a dielectric withstand of 1500 V for one minute as specified in IEEE C37.90. The lockout relay shall also be capable of meeting the IEEE C37.90 surge withstand capability tests. *The lockout relay shall be furnished with 10 electrically separate normally close contacts and 20 electrically separate normally open contacts in only one lockout relay.* The contacts shall be rated to carry 30 A for 3 s, 5 A continuous, and be capable of *interrupting* 2 of inductive current (L/R ;S40 ms) in a 125 V DC control circuit. The contact resistance shall have a test value of less than 10 milliohms and be rated for at least 10,000 operations. The contacts shall be easily convertible in the field to normally open or normally closed contacts.

The schematic diagram for tripping circuit shall be as shown on typical drawing No RX-TSD-01 attached.

8.6 DC Circuit Arrangement. Each phase and neutral reactor control cabinet shall be furnished with a DC circuit arrangement as described below.

- a. A single 125 V DC circuit shall be provided to the reactor cabinet by the Contractor.
- b. The DC circuit shall be connected through a two pole, single throw knife blade disconnect switch.
- c. *A DC undervoltage relay with adjustable both operating time and operating voltage shall be provided to detect loss of DC supply voltage to the reactor and shall be located on the circuit side of the*

disconnect switch. The undervoltage relay shall be furnished with normally closed contacts which shall close on loss of DC to energize an AC relay. This AC relay shall energize the local annunciator "LOSS OF DC SUPPLY" point. The AC relay shall be located in the reactor AC supply circuit and shall provide local and remote indication of loss of DC.

- d. Branch circuits shall be provided for reactor protection and for reactor annunciator control.
- e. *A DC circuit shall be provided as described above for energizing the local annunciator "LOSS OF AC SUPPLY" and "LOSS OF AC CONTROL PWR" points and for providing two electrically separate remote indication contacts per point. These annunciator points shall only reset when a reset pushbutton is operated and the AC voltage returns to normal.*
- f. Each branch circuit shall be furnished with a DC circuit breaker which has a suitable interrupting rating, but not less than 5 kA. The circuit breaker shall be furnished with a position indicating contact which will provide a contact closure for local annunciation when the circuit breaker is open. *Contacts of all circuit breakers shall be operated by both manual and automatic trip.*

The breaker position indicating contact on the annunciator circuit DC breaker shall energize an AC relay. This AC relay shall energize the local annunciation for "LOSS OF DC CONTROL PWR" point and provide remote contacts for remote indication and the sequence of events recorder.

8.7 AC Circuit Arrangement. Each phase and neutral reactor control cabinet shall be furnished with an AC circuit arrangement as described below.

8.7.1 A single phase, two wires, 230 V AC, 50 Hz power supply shall be provided to the reactor cabinet by the Contractor.

8.7.2 The AC circuit shall be connected through a two pole, single throw knife blade disconnect switch.

8.7.3 *An AC undervoltage relay with adjustable both operating time and operating voltage shall be provided to detect loss of AC supply voltage to the reactor and shall be located on the circuit side of the disconnect switch. The AC undervoltage relay shall energize the local annunciator "LOSS OF AC SUPPLY" point.*

8.7.4 *Branch circuits shall be provided for reactor protection and for reactor annunciator control.*

8.7.5 An AC circuit shall be provided as described above for energizing the local annunciator "LOSS OF DC SUPPLY" and "LOSS OF DC CONTROL PWR" points and for providing two electrically separate remote indication contacts per point. These annunciator points shall only reset when a reset pushbutton is operated and the DC voltage returns to normal.

8.7.6 *Each branch circuit shall be furnished with a AC circuit breaker which has a suitable interrupting rating, but not less than 5 kA. The circuit breaker shall be furnished with a position indicating contact which will provide a contact closure for local annunciation when the circuit breaker is open. Contacts of all circuit breakers shall be operated by both manual and automatic trip. A branch circuit breaker shall be furnished to feed the cabinet lights, duplex receptacle and heater requirements.*

- a. **Space Heater.** A space heater with temperature supervised humidity control shall be provided for use with a 230 V AC, 50 Hz single phase power supply. The heater shall be located to promote warm air circulation to prevent cabinet interior condensation while avoiding accelerated deterioration of insulation and other components.
- b. **Lighting.** An interior convenience lamp complete with an on/off switch for use with a 230 V AC single phase power supply shall be provided.
- c. **Duplex Receptacle Outlet.** A two wires duplex receptacle outlet shall be supplied rated for 20 A and 250 VAC. The outlet shall be capable of accepting both parallel flat blades and in-line round pin plugs. Adjacent parallel face spacing of the outlet blade-pin shall be 11 mm maximum.

The breaker position indicating contact on the annunciator circuit AC breaker shall energize a DC relay. This DC relay shall energize the local annunciation for "LOSS OF AC CONTROL PWR" point and provide remote contacts for remote indication and the sequence of events recorder.

8.8 Drain and Filter Valves. In addition to the drain and filter valves required for the conservator and radiator, the main tank shall be furnished with drain and filter valves as listed below. *The drain and filter valves shall be extended down and located for ease in operating from ground level.*

- a. Combination of drain valve and lower filter-press connection.
- b. Combination of upper filter valve vacuum valve, and upper oil filter-press connection.
- c. Isolating valve between the conservator and main tank.

8.9 Oil Sampling Device. The drain valve shall be equipped with a sample valve, not less than 6 mm, which must be installed on the outlet side of the drain valve. The drain valve shall be equipped with a plug.

8.10 Transportation. *The permissible impact value of shunt reactor during transportation shall be designed not less than $\pm 3G$ in three dimensions.*

8.11 Neutral Bushing and Surge Arrester Grounding Pads. Separate flat grounding pads each complete with a non-corroding clamp type connector suitable for connecting a No.4/0 AWG stranded copper ground cable shall be furnished for each of the following:

- a. Phase reactor neutral bushings.
- b. Neutral reactor neutral bushing.
- c. Surge arrester and discharge counters when specified.

8.12 Tank Grounding Pads. Two reactor tank flat grounding pads complete with a non-corroding clamp type connector suitable for connecting a No.4/0 AWG stranded copper ground cable shall be furnished.

8.13 Phase Reactor External Neutral Connections. When a neutral reactor is not specified or applied, ground conductor connections shall be provided between the phase neutral bushings and from the neutral bushing to the grounding pad utilizing No.4/0 AWG insulated copper conductor suitably supported on the tank. When a neutral reactor is utilized, Contractor shall provide conductor connections from the phase reactor neutral bushing to the neutral reactor and from the neutral reactor bushing to the surge arrester utilizing No.4/0 AWG insulated copper conductor.

8.14 Neutral Reactor External Neutral Connections. Ground conductor connections from the surge arrester, discharge counter and neutral bushing shall be installed. Ground conductor connections between the surge arrester and discharge counter and from discharge counter to the ground pad shall be made using No.4/0 AWG insulated copper conductor supported on the tank mounted porcelain insulators. Connections between the neutral bushing and the ground pad shall also be made using No.4/0 AWG insulated copper conductor suitably supported on the tank.

8.15 Nameplate. A nameplate shall be furnished as described in IEEE C57.21. A schematic drawing shall be included on the nameplate. Showing all windings, current transformers and associated devices. The nameplate shall also include EGAT's Contract, Item, and EGAT's serial number. The nameplate shall be anodized aluminum having white engraved letters on a black background. The nameplate shall be attached with non-corroding screws and located to be normally legible from ground level. The nameplate and/or adjacent nameplate shall include, for each current transformer, the accuracy class, ratio and all secondary ampere ratings and identification of the terminal to which it applies. Individual nameplates shall also be furnished with each valve, oil sampling device, level device, temperature device, Buchholz relay and all control cabinet devices which identify the device and pertinent characteristics.

8.16 Gas Pressure Equipment. Inert gas pressure equipment consisting of, but not limited to, a pressure gage, pressure regulator and gas cylinder manifold for use during shipment when pressurized with inert gas.

- 8.17 Impact Recorder.** A three dimensional impact recorder with time period recording chart of at least 3 months for transportation on the basis of returning back after the reactor arrive at the substation site.
- 8.18 Cover and Manholes.** A welded main cover and manholes shall be provided according to ANSI/IEEE C57.21.
- 8.19 Core Ground.** A single-core ground shall be provided and accessible from the tank exterior without removing oil to permit measurement of the core insulation.
- 8.20 Ladder.** *Ladder fixed on the reactor tank which is above ground level at 300 mm and extended to conservator for servicing the reactor. The caution plate to prevent an unauthorized person shall be provided.*
- 382-9 Control Cabinet.** The phase and neutral reactors shall be furnished complete with a tank mounted control cabinet which shall house terminal blocks, annunciator, auxiliary relays and other auxiliary devices. The control cabinet shall be weatherproof, rigidly framed and fabricated for 3 mm minimum thickness sheet steel.
- 9.1 Type.** The control cabinet shall be of the dead front type with gasketed, vertically hinged and adequately braced front doors. The doors shall have a latching handle complete with a key lock and shall be 180 degree opening with a latching device in the fully open position. Center opening doors shall be provided where the door width exceeds 760 mm. Central opening doors shall have no obstruction between the doors that would prevent easy access to the control cabinet. The interior of the front door shall be provided with a holder suitable for the storage of one complete set of reactor drawings and instruction books. The cabinets shall have baffled louvers complete with insect screens. The control cabinet shall be mounted at an elevation such that control switches, lockout relays and pushbuttons are located approximately 1.0 m above floor level.
- 9.2 Conduit Entrance.** The control cabinet shall be furnished with detachable blank "knockouts" for at least five 2-1/2 inch. Conduits located at the bottom of the cabinet.
- 9.3 Wiring.** All wiring shall have flame resistant polyvinylchloride insulation, shall not have a cross sectional area less than 4 mm² and shall be stranded. All current transformer secondary circuits shall not have a cross sectional area less than 6 mm² and shall be stranded. Each wire terminal shall be furnished with a wire designation sleeve that is not easily removed. The sleeves shall be marked to agree with the terminal block designations and the equipment drawings. All markings shall be of a permanent type (machine stamped or engraved). Crimped on, *insulated*, ring tongue type connectors shall be furnished on all wire connections to internal devices and terminal blocks. Metal conduit shall be used for routing all wiring to the control cabinet. All alarm, annunciation, control and indication devices shall be completely wired.

9.4 Terminal Blocks. Terminal blocks shall be provided in the reactor control cabinet for terminating the current transformer secondary windings, annunciation, alarm, control and protection wiring. The current transformer, annunciation, alarm, control and protection terminal blocks shall be rated for 600 V AC, 30 A and be capable of handling a maximum of two 6 mm² conductors per terminal. The external wiring side of a terminal block shall contain no more than one wire and the internal wiring side shall contain no more than two wires. The terminal blocks shall be provided with white marking strips without covers. The white marking strips shall be marked with a circuit designation which will identify the circuit. The designation shall be identical to the wiring sleeve designation and the wiring schematic and connection diagrams. The current transformer secondary circuits shall be terminated on 6 pole short circuiting type terminal blocks. Extra terminals shall be provided for future modifications. Spare terminals shall be provided in the quantity of at least 10% of the active terminals on each terminal block for future use or modifications. A minimum clearance of 125 mm shall be provided between terminal blocks to facilitate wiring.

9.5 Ground Bus. A 25 mm x 6 mm copper ground bus with 4 mm drilled and tapped holes shall be provided and bolted solidly to the enclosure near the bottom of each control cabinet for current transformer secondary and control cable shield grounding. The holes shall be spaced on 20 mm center-lines minimum. A 10 mm long binding head screw or screw with bronze spring washer shall be provided in each hole. The control cabinet ground bus shall have a minimum of five holes and screws. EGAT shall have the option of specifying additional ground bus holes and screws at the time of drawing approval without additional cost to EGAT.

A clamp type connector suitable for accepting a No. 4/0 AWG stranded copper grand conductor shall be provided at one end of each cabinet ground bus.

9.6 Annunciator. A lamp type annunciator shall be furnished and installed within the control cabinet of the phase and neutral reactors. The annunciator shall indicate the reactor trouble described below. At least two spare fully equipped windows shall be provided with each annunciator.

The annunciator windows shall be readable through a safety type, shatterproof glass or plastic window without opening the control cabinet doors. Annunciator window shall be red in case of trip and winding temperature alarm stage 2, white in case of alarm.

When any reactor trouble condition occurs, the corresponding annunciator window shall be illuminated and two, electrically separate contacts for remote indication shall close. The window shall remain illuminated and the remote indication contacts shall remain closed until the reset push button is operated and the trouble is cleared. Each remote contact shall be wired to separate annunciator terminals. One remote indication contact shall be paralleled with other alarm points to provide a common remote alarm and one remote contact shall be provided for wiring to the substation sequence of events recorder.

The annunciator shall include a reset push button and a lamp test push button mounted on the annunciator. *The lockout relay manual reset type and the 86RA-CO "NORMAL-OFF" cut-off selector switch with 10 electrically separate contacts of 10 A continuous current rating shall be provided and located in control cabinet.*

For those trouble conditions requiring both circuit breaker tripping and annunciation, the trouble contact shall trip the reactor lockout relay directly *via cut-off switch*. A high speed auxiliary relay with an electric latch connected in series with the trouble contact shall be furnished. A contact from the auxiliary relay shall be connected to actuate the annunciator and remote indicating contacts. The relay shall be unlatched and reset by the operation of the annunciator push button only if the fault has cleared. No diodes shall be used in the tripping or annunciation scheme.

Two faults at one time shall both be annunciated correctly and only a fault that has cleared can be reset with the reset pushbutton.

Each annunciator provided in the phase and neutral reactor control cabinets shall be furnished with window descriptions as described below.

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382-10 Weight and Dimension Limitations. The Contractor shall furnish reactors that meet the EGAT shipping weight and dimension limitations described elsewhere. These shipping weight limitations reflect the maximum lifting weights that can be handled as well as the transportation weight limits to the installation site.

382-11 Painting. The phase and neutral reactor finish shall consist of a pigment type paint as specified in IEEE C57.21. All steel surfaces shall be properly primed to prevent corrosion and then painted with two coats of ANSI 70 light grey finish coats. The total exterior paint thickness shall be a minimum of 105.

The Contractor shall furnish EGAT a quantity of factory supplied paint sufficient for one complete coat of the reactor.

382-12 Tests. The phase reactor, neutral reactor, bushing, current transformers and accessories shall be tested in accordance with IEEE C57.21, IEEE C57.19 and IEEE C57.13. All power frequency testing shall be performed using a 50 Hz power supply. The Contractor shall be responsible for the costs of all testing.

12.1 Design Test

a. Reactor. One unit of reactor being supplied for each capacity and voltage rating shall be subject to the actual following test items, unless otherwise specify in each test item.

1. Pressure and leakage test on reactor tank. The reactor tank shall be subject to an internal gas pressure of 1 kg/cm² for 30 minutes and under the pressure test the leakage shall be checked.
2. Vacuum test on reactor tank. The reactor tank shall be subject to a vacuum of less than 10 mmHg for 30 minutes, after the test, the deformation shall be checked.
3. Vibration tests. Vibration tests shall be performed to measure the vibration amplitudes and frequency with accelerometers attached directly to the tank wall with the shunt reactor energized at rated voltage and frequency. Dynamic stresses shall be measured by means of strain gages at the points of greatest acceleration and at all welds.
4. Temperature rise tests.
5. Audible sound level. (*performed with the unit at close to operating temperature.*)

7. Applied voltage tests
8. *Low frequency overvoltage test*
9. Partial discharge measurement by using ERA-method
10. Insulation resistance
11. Insulation power factor
12. Linearity tests. Linearity tests shall be provided on the shunt reactors up to 1.50 x rated voltage. Linearity tests shall be provided on the neutral reactors up to the 10 s short time overvoltage rating of 1.4 x rated voltage.
13. Leak tests. Leak tests shall be provided showing positive tank sealing up to rated tank pressures.
14. *Audible sound level (performed with the unit cold)*
15. *Frequency response measurement. The measuring frequency range shall be from 10 Hz to 1 MHz.*

b. Bushing Routine Tests. The Contractor shall perform the routine tests listed below on all reactor bushings according to IEEE C57.19.00

1. *Rated frequency dry withstand voltage test with partial discharge measurement.*
2. Capacitance measurements (If applicable)
3. Power factor measurements (If applicable)
The result corrected to 25°C shall not be greater than 1%
4. Potential tap withstand voltage test (If there is any tap)
5. Internal pressure test *(If applicable)*
6. *Creepage* distance measurement (one unit of each rating and type shall be subject to this test.)

For 33 kV and below Solid type bushing, the tests according to IEC 60137 can be accepted.

c. Current Transformer Routine Tests. The Contractor shall perform the routine tests listed below on all current transformers furnished. *The following tests shall be performed in accordance with the latest IEEE C57.13.*

1. Accuracy tests for each ratio of all winding (including excitation curve for one unit of each rating)
2. Polarity tests
3. Winding resistance
4. Induced voltage tests
5. Applied voltage tests

d. Material and Accessory Tests Report. Test report of the following material and accessories used in each supply shall be submitted.

1. Insulating oil
2. Core steel
3. Winding conductor
4. Insulation paper and pressboard
5. Radiator
6. Reactor supervisory equipment

12.3 Test Reports. Four certified copies of the reports of all EGAT specified tests shall be furnished to EGAT as soon as possible, but not later than seven days, after the completion of the tests. The Contractor shall bear all costs of furnishing these reports.

382-13 Spare Parts. Spare parts as specified in Price Schedule and one complete set of spare gasket for each reactor to be used during erection at site shall be supplied. All spare parts including spare gasket subject to damage or deterioration by moisture shall be packed in moisture-proof material. All spare parts shall be of the same material and workmanship as the corresponding original parts and shall be interchangeable there with.

382-14 Appliances and Tools. The Contractor shall furnish all special appliances and tools that the equipment manufacturer deems necessary for satisfactory installation, operation, testing and maintenance of the equipment, including assembly and disassembly. Special tools and appliances shall be constructed as those that are not readily available from appliance and tool suppliers in Thailand and those that the equipment manufacturer has procured or fabricated for use with the equipment or similar equipment. The Contractor shall submit to EGAT for approval a list of all appliances and tools required for above stated purposes and shall indicate thereon all appliances and tools he proposes to furnish.

382-15 Final Design Data. The Contractor shall furnish the following final design data for each transformer based on final design calculation:

- a) Losses in kilowatts at rated voltage and rated frequency at 80 °C. The equation of the losses in magnetic shunt or core at the voltage corresponding to rated current (P_f) shall be submitted.
- b) Over excitation
 - Capability duration time at 105/125/140% rated voltage (50 Hz)
 - Capability duration time at 100% rated voltage (48 Hz)
 - Overvoltage for 10 s (50 Hz)
- c) Continuous current for 10 min of neutral reactor without mechanical failure.

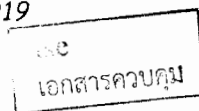
- d) *Temperature rise of top oil and winding including hot spot factor. The detail of hot spot factor, formula with all parameters or simulation graph, shall be submitted.*
- e) *Linearity Curve*
 - *For shunt reactor: The range of graph shall cover 1.5 times of rating.*
 - *For neutral reactor: The range of graph shall cover 1.4 times of rating.*
- f) *Overall dimensions and weight of all principal parts.*
- g) *Identification by name and total weight and dimensions of heaviest part that must be lifted by the crane during assembly and disassembly.*
- h) *Impedance in ohms at rated voltage and rated frequency*
 - *Resistance*
 - *Reactance*
 - *Total impedance*
 - *Zero sequence impedance*
- i) *Detailed calculation showing all parameters of mechanical stress and force result of neutral reactor shall be submitted to demonstrate that the neutral reactor as designed can withstand the effects of through faults. The data of proof stress of winding shall be submitted.*
- j) *Detailed calculation of designed vibration limit including formula and values of young modulus or other factors.*
- k) *Designed audible noise level.*
- l) *Internal construction of core and winding. The construction shall be show arrangement of each phase and the shielding between phases (if any).*

Increase in values of items (f) and (g) over those given in the Proposal Data shall be limited to 10% but not more than EGAT's specified values elsewhere.

EGAT reserves the right to review the detailed design of reactor without changing the guaranteed losses values.

382-16 Drawings and Documents for Phase and Neutral Reactor. Drawings and documents for approval shall at least comprise of the following

A. Drawings for Approval



Item	Drawings Title	Approval and Final Dwgs	CD-ROM
1	Drawing list of all drawings submitted for approval	x	x
2	Phase and neutral reactor outline including legend of all accessories	x	x
3	Phase and neutral reactor bottom view showing the skidding base	x	x
4	Phase and neutral reactor foundation including location of control cubicle and grounding terminals	x	x
5	Shipping and transportation sketch. (Main tank, etc.) including the value of pressure, moisture content and allowable impact figures	x	x
6	Phase and neutral reactor nameplate including Phase and neutral reactor top and front view with dimension	x	x
7	CT connecting plate complete with current ratio	x	x
8	Control schematic diagram with terminals indication of each relay, contact, switch, etc. - AC & DC control - Annunciator, alarm & trip circuits with indication of the setting value of all protective devices	x	x
9	Drilling plan of parts to be installed at the remote control board combined in one drawing	x	x
10	Phase and neutral reactor control cubicle outline (including indication of accessories location, nameplate of each accessory and annunciator windows with abbreviation of faults)	x	x
11	Bushing outline	x	x
12	Terminal pad of Bushing and Surge Arrester	x	x
13	Grounding terminal connector	x	x
14	Terminal blocks layout of real physical arrangement including terminals indication and indication for external connection in phase and neutral reactor control cubicle	x	x
15	Wiring diagram (including internal wiring diagram) in the phase and neutral reactor control cubicle	x	x
16	Wiring connection of supervisory equipment including indication or wire sizes	x	x
17	Oil piping and valve connection diagram	x	x

Item	Drawings Title	Approval and Final Dwgs	CD-ROM
18	Grounding connection arrangement with ground wire size indication	x	x
19	Description of contact capacity of all relays	x	x
20	List of spare parts and spare gaskets with shape, quantity and dimension	x	x
21	List of tools and appliances	x	x
22	Secondary terminal arrangement of BCT	x	x
23	Test tap outline for all bushings	x	x
24	Load list of phase and neutral reactor control cubicle	x	x
25	Container list	x	x
26	Magnetic field plot of phase and neutral reactor	x	x

B. Data and Description Material

- a) Bushing current transformer secondary excitation and ratio correction factor curves for each ratio.
- b) Operating description for
 - Cooling control
 - Annunciating and tripping circuit
- c) Description or catalog data and drawings for
 - Conservator of reactor tank
 - Pressure gauge for transportation of reactor tank
 - Pressure relief device
 - Buchholz relay
 - Air detector relay for conservator
 - Reactor pressure relay
 - Winding temperature relay
 - Winding hot pot temperature detector
 - Dial type oil level gauge
 - Dial type oil temperature indicator
 - Auxiliary tripping and lockout relay
 - All kinds of auxiliary relay
 - AC & DC undervoltage relay
 - All kinds of selector switch, control switch and push button
 - Silica gel breather
 - All kind of valves
 - Oil sampling device
 - Radiator
 - Reactor gaskets characteristic
 - Insulating oil characteristics
 - Reactor insulation material and pressboard
 - Outlet of 20 A, 250 Vac

- d) *Component Part Data - One drawing shall be furnished showing the following information, as applicable, for each component part (contractors, relays, auxiliary relays, control devices, switches, etc.)*
- *Manufacturer*
 - *Manufacturer's type and/or catalog number*
 - *Rating*
 - *Type and number of contacts*
 - *Contact AC and DC continuous, make and resistive and inductive interrupting ratings*
 - *Coil impedance and power factor*

382-17 *Instruction Manual for Phase and Neutral Reactor. Instruction manual shall consist of all necessary information and shall comprise of at least the following parts.*

Part A *Reactor instruction including installation, operation and maintenance manuals.*

a. *Reactor general technical information*

b. *Installation instruction including but not limited to*

- *Moving method for the reactor tank by skidding on the rollers*
- *Moving method for complete assembly reactor by skidding on the rollers*
- *Inspection including interpretation of shock recorder level*
- *Flow chart of installation*
- *Installation instruction*
- *Vacuum oil filling*
- *Method of drying out at site*
- *Characteristic of insulating oil*
- *Tank assembly*
- *External assembly for complete reactor*

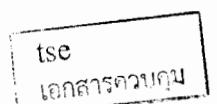
c. *Maintenance and Operation instruction*

- *Routine inspection*
- *Maintenance*
- *Operation guide*
- *Guide for maintenance of long storage reactor*
- *Interpretation of gas analysis for reactor in service*
- *Internal assembly of reactor*

Part B *Instruction and manual catalogs including installation and maintenance manual of all accessories.*

Part C *Complete set of all final drawings.*

Part D *Final design data.*



PHASE AND NEUTRAL REACTOR ANNUNCIATOR

TROUBLE AND TRIPPING SCHEDULE

<u>Item</u>	<u>Trouble</u>	<u>Annunciator Window Legend</u>	<u>Tripping Required</u>
1	Oil temperature high	OIL TEMP HI	
2	Oil level low	OIL LEVEL LO	
3	Pressure relief device operation	PRESS RELIEF ALARM	
4	Winding temperature alarm stage 1	WDG TEMP ALARM STG. 1	
5	Winding temperature alarm stage 2	WDG TEMP ALARM STG. 2	
6	Buchholz relay operation (alarm)	BUCHHOLZ RLY ALARM	
7	Buchholz relay operation (trip)	BUCHHOLZ RLY TRIP	X
8	Conservator rubber bag rupture	RUBBER BAG RUPTURE	
9	Loss of DC supply voltage	LOSS OF DC SUPPLY	
10	Loss of AC supply voltage	LOSS OF AC SUPPLY	
11	Loss of annunciator DC	LOSS OF DC CONTROL PWR	
12	<i>Lockout Operate</i>	<i>LOCKOUT OPERATE</i>	
13	<i>Cut off selector switch operate</i>	<i>CUT OFF SW. OPERATE</i>	
14	Spare		
15	Spare		

Specification No 393

Metal Oxide Surge Arresters

393-1 General. This specification covers the general requirement for design, manufacture, test and supply of metal oxide surge arrester.

The specific ratings, characteristics and the special requirements and features of the equipment not covered herein are given in the accompanying Ratings and Features sheet (if any).

393-2 Materials and Workmanship. All materials shall be new and shall be the best available for the purposes used, considering strength, ductility, durability and suitability for the intended services and best engineering practice. Workmanship shall be of the highest grade and in accordance with the best modern standard practice.

393-3 Service Conditions. All materials shall be suitable for installation and use at an altitude of 1000 m or less in a tropical climate with a maximum ambient temperature of 45°C and 100% relative humidity for outdoor equipment (or a maximum ambient temperature of 40°C and 90% relative humidity for indoor equipment) without corrosion, deterioration or degradation of performance characteristics.

393-4 Codes and Standards. All equipment, materials, devices, fabrication and testing shall conform to the codes, specifications and standards listed below and all applicable codes, specifications and standard referred therein.

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
IEEE	The Institute of Electrical and Electronics Engineers
ICEA	Insulated Power Cable Engineer Association
NEMA	National Electrical Manufacturers Association

All threaded parts requiring external connection shall have UNC screw and pipe threads. All internal parts may have threads in accordance with the established specification in the country of manufacturer.

It is the intent that all equipment, materials, devices, fabrication and testing shall conform to the application codes, specifications and standards even though they are not specifically noted herein. Equivalent codes, specifications and standards established and approved in the country of equipment or material manufacture may be used subject to EGAT's

approval. If this election is made, the Bidder shall so state and include in his bid the governing codes, specifications, and standards proposed together with an itemized list of specific deviations from the requirements of codes, specifications and standards referred herein.

The latest issue of all codes, specifications and standards shall govern.

The most stringent requirement, in the event of code, specification or standard conflict, shall govern. This specification shall govern in the event of discrepancies between it and applicable codes, specifications and standards.

393-5 Construction and Performance

393-5.1 Constructions

- a. **General.** Each arrester shall be new and a current standard production model with modifications as may be required to satisfy the requirements stated herein.

The arresters shall conform to the applicable requirements of IEEE Std C62.11, except as stated herein or as shown on the accompanying Ratings and Features sheets.

The arrester shall be self-supporting and base mounted unless otherwise specified in Ratings and Features sheet. Each arrester shall be furnished completely with an insulating base and a cyclometer type discharge counter with integral continuous AC leakage internal current indicator.

- b. **Insulator.** Arrester insulator columns shall conform to the applicable requirements of ANSI C29.1 and C29.2 and NEMA Publications HV1 and LA1, except as stated herein or as shown on the accompanying Ratings and Features sheet.

All arrester, insulator column steel parts shall be hot-dip galvanized after fabrication in accordance with the applicable provisions of ASTM A123 and A153. Threads shall be undercut an amount sufficient to allow for the galvanized coating. All galvanizing shall be performed in accordance with the best modern practice.

- c. **Line Terminals.** The line terminal of each arrester shall be equipped with clamp type connector suitable for conductor stated in Ratings and Features Sheet.
- d. **Pressure Relief Device.** Each arrester shall be equipped with a pressure relief device, all venting is out the bottom of the arrester or arrester chamber to the outside ambient atmosphere.

- e. **Creepage Distance.** Each arrester shall have a minimum creepage distance as specified on the accompanying Ratings and Features sheet.

393-5.2

Performance. All surge arrester shall have the protective characteristics and arrester insulation withstand test voltage as specified in "**CHARACTERISTICS OF METAL OXIDE SURGE ARRESTER**" attached.

- a. **Rating.** Arrester ratings shall be consistent with the data and requirements stated herein and as shown on the accompanying Ratings and Features sheets.
- b. **Equivalent Front-of-Wave Protective Level (FOW).** Arrester equivalent front-of-wave protective levels shall be the maximum discharge voltage for current impulses which produce voltage waves cresting in 0.5 μ s. The current impulse shall be 10 kA.
- c. **Impulse Discharge Voltage.** Arresters shall have crest discharge voltage ratings for an 8x20 μ s current impulse having crest values of 5, 10 and 20 kA.
- d. **Switching Surge Protective Level (SSPL).** Arrester switching surge protective levels shall be based on a 45x90 μ s wave shape coordination current of 0.5 kA for ratings of 488 kV and below and of 1 kA for higher ratings.
- e. **Duty Cycle.** Arresters shall have a duty cycle withstand of 10 kA. Arrester duty cycle withstand shall be based on arrester rated voltage being applied during the entire duty cycle test period.
- f. **High Current , Short Duration Withstand.** Arresters shall have a 100 kA, 4x10 μ s wave shape high current, short duration withstand capability.
- g. **Pressure Relief Capability.** Arresters shall have a minimum pressure relief high current capability of 40 kA symmetrical. The capability first crest asymmetrical magnitude shall be based on a asymmetrical offset factor of 2.6.
- h. **Transmission Line Discharge Energy Capability.** Arrester total transmission line discharge energy capability shall be based on the energy absorption capability for a period of one minute with maximum system line to ground voltage maintained capability shall not be less than 4 kJ/kV unless otherwise specified accompanying Ratings and Features Sheet.
- i. **Arrester Insulation Withstand Voltage.** The assembled insulating members of the arrester shall be withstand impulse and power frequency voltages between line and ground terminals in

accordance with "CHARACTERISTIC OF METAL OXIDE SURGE ARRESTER" attached.

- j. **Visible Corona.** Each arrester shall exhibit no visible corona in complete darkness when energized with a test voltage applied to its terminals equal to 1.05 times the maximum phase to ground operating voltage.
- k. **Radio Influence Voltage.** The RIV for each arrester (properline terminal adequately shielded) shall not exceed 50 μ V for arrester voltage rating 36 kV and below and shall not exceed 200 μ V for arrester voltage rating 60 kV and above when the arrester is energized with a test voltage applied to its terminals equal to 1.05 time the maximum phase to ground operating voltage.

393-6 Accessories

- a. **Ground Connections.** Each arrester shall be furnished completely with a non-corroding clamp type ground connector suitable for No 4/0 AWG stranded copper conductor.

No 4/0 AWG copper ground conductor connections between arresters and discharge counters shall be provided and shall be insulated, insulator supported to prevent conductor movement.

- b. **Discharge Counter.** Discharge counters with AC leakage internal current indicator shall be of the cyclometer dial type for automatically recording the number of arrester surge discharges. The counter/indicator shall have negligible effect on arrester protective level. Discharge counter operation shall not require an external power source. Each discharge counter assembly shall include a suitable non-corroding arrester connector and a non-corroding clamp type ground connector suitable for No 4/0 AWG stranded copper ground cable.

- c. **Marking and Nameplates.** Each arrester shall be provided with an attached identification nameplate satisfying, but not limited to, the applicable requirements of IEEE Std C62.11. The nameplate shall include the arrester maximum continuous operating voltage and EGAT's Contract and item numbers and shall be located to be readily legible. The nameplate shall be anodized aluminum having white engraved letters on a black background and shall be attached with non-corroding screws.

393-7 Test. Test of equipments shall be performed according to the requirements specified in each referred test item. The costs of all tests and reports shall be borne by the Contractor.

393-7.1 Design Test. The proposed equipment shall already have the design test record of the same type and same rating as EGAT called for, in accordance with the tests specified in each equipment test items, which is subject to EGAT's approval (unless otherwise specified in

each equipment test item). The design test record shall be required and submitted together with the tender document during the bidding.

- 393-7.2 Routine test.** Each equipment shall be completely assembled at the factory and subject to the tests specified in each equipment test item.
- 393-7.3 Quality Conformance Test.** The quality conformance test shall be performed by selecting the sample from each lot of equipment. The numbers of samples for the test shall be as specified in the Standard.
- 393-7.4 Test Report.** The report of all tests, curves and standard application data shall be furnished to EGAT immediately after completion of the tests.
- 393-7.5 Test Procedure.** The Contractor shall submit the test procedure of specified tests and actual design tests to EGAT for approval. The test procedure shall consist of procedures, applied voltage, current and criteria to justify the result of the tests.
- 393-7.6 Test Items for Metal Oxide Surge Arrester.** The tests shall be performed in accordance with the latest IEEE Std C62.11 except as note herein.

a. Design Tests

- (a) Arrester insulation withstand test.
- (b) Discharge voltage characteristics.
- (c) Impulse protective level voltage-time characteristics.
- (d) Discharge current withstand test.
- (e) Duty cycle test.
- (f) Internal ionization voltage and RIV test.
- (g) Pressure relief test
- (h) Contamination test.
- (i) Temporary overvoltage (TOV) test.

b. Routine Tests

- (a) Reference voltage and current test.
- (b) Measurement of leakage current at nominal system voltage (line to ground) and at maximum continuous operating voltage.
- (c) Power frequency test.

- (d) Peak RIV test at 1.05 times maximum continuous operating voltage.
- (e) Discharge voltage test at 10 kA.
- (f) Seal test.
- (g) Creepage distance measurement. One unit of each type and rating shall be subject to this test.

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393-9 Instruction Manual for Metal Oxide Surge Arrester

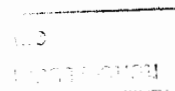
Instruction manual shall consist of all necessary information and shall comprise at least the following parts :

Part A Surge arrester instruction including installation, operation and maintenance.

- a. Surge arrester general technical information
- b. Installtion instruction including but not limit to
 - Transportation
 - Inspection
 - Installation
- c. Operation and maintenance
- d. Catalog

Part B Complete set of all final drawing and/or documents.

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CHARACTERISTIC OF METAL OXIDE SURGE ARRESTER

Arrester Voltage Rating (kVrms)	MCOV (min.kVrms)	Protective Level (maximum kVcrest)					Arrester Insulation Withstand Test Voltage		
		FOW (0.5 μ s)	Discharge Voltage (8 x 20 μ s)			SSPL (45 x 90 μ s)	Impulse 1.2 x 50 μ s (kVcrest)	50 Hz Dry (kVrms)	50 Hz Wet (kVrms)
			5 kA	10 kA	20 kA				
10	8.4	35	29	31	36	23	110	50	45
15	12.7	53	38	41	45	33	110	50	45
21	17	65	53	56	64	42	150	70	60
24	19.5	73	61	65	73	49	150	70	60
30	24.4	89	72	77	88	61	200	95	80
36	29	113	90	95	107	75	200	95	80
60	48	175	136	142	153	122	350	175	145
72	57	201	168	173	187	147	350	175	145
96	76	265	215	227	245	195	450	225	190
108	84	299	242	256	276	219	550	280	230
120	98	333	286	305	310	244	550	280	230
192	152	530	426	454	490	390	900	465	385

MCOW = Max. Continuous Operating Voltage
 FOW = Front of Wave
 SSPL = Switching Surge Protective Level

Use
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