SYRIAN ARAB REPUBLIC
MINISTRY OF ELECTRICITY

PUBLIC ESTABLISHMENT FOR DISTRIBUTION AND EXPLOITATION OF ELECTRICAL ENERGY

(PEDEEE)

TECHNICAL SPECIFICATION FOR CURRENT AND VOLTAGE TRANSFORMERS For 20 KV SWITCHGEAR

Prepared by:
Eng. Subhi Salem
Mr. Hasan Alksh
Mr. Ahmed Naeel AL akhras
Eng. Mohamed Rajeh
Eng. Houmam Hrba
Eng. Firas Moosa Basha

Approved by

GENERAL DIRECTOR of PETDE

Engineer Khaled Abu DI

I- SCOPE OF SUPPLY:

Manufacturing, testing, delivery C + F Syrian Sea port 20 kV voltage , current transformers, And Toroidal cast -resin insulated current transformers.

to be installed in 20 KV exsisting cubicles of deferent manufacturers, for replacing existing equipment and a spare parts with the minimum modifications in the existing panels , the attached drawings show cross sections for a different type of panels where the above mentioned current and voltage transformers will be installed .
Toroidal cast -resin insulated current transformers should be suitable to fit one phase of three Phase circuit 20 KV copper cables with 300 mm^2cross section for the outgoimg feeder
(one CT per phase around one cable per phase) .
and for one phase of three phase circuit 20 KV copper cables with 2x300 mm^2cross section for the incoming feeder (one CT per phase around two cables per phase - double circuit).
Bidders should visit some substations to see the installed panels and gurantee in that the offered equipment could be installed insid the panels with minimum modifications .
Succesfull offerer should be submit afree sample of each type of the current & voltage transformer afteraward the subject and befor commencement order
It is preferable to suggest the needed modifications in the offer for each type of panels to make shore it will be install in the site .

LIST OF QUANTITIES

DESCRIPTION	QUANTITY
20 kv voltage transformers	**50**
20 kv current transformers	**260**
Rated primary / secondary(5A) current :	
600-1200/5/5/5	**20**
200-400/5/5	**50**
150-300 /5/5	**70**
50-100/5/5	**20**
200-400/1/1	**50**
150-300/1/1	**50**
Toroidal cast -resin insulated CTs	
600-1200/5/5	**40**
200-400/5/5	**30**
150-300 /5/5	30

2- INTRODUCTION

This description determines the minimum requirements of the PEDEEE for design material, testing and supply of CURRENT AND VOLTAGE TRANSFORMERS installed in existing kv switchgears installed in 66/20 kv substations , under electric system conditions & service conditions of SYRIA

For preparing tenders in good and complete form, offerers are requested to examine carefully the tender documents in order to ascertain the matters on which they will be deemed to have satisfied themselves and the risks and obligations which they are to undertake.

The form of the tender and all accompanying documents shall be completely filled in and signed by offerer and must not be altered or mutilated. The offerer shall fill technical specification list

(Guarantee schedule)and give clear technical information and dimensions in detail.

The delivery period of equipment will be as follows :

- 100% of the equipment within 6 months from the starting order.

The offerer shall give answers to all questioned mentioned in the tender book.

All the needed data should be fulfilled and the pages signed by the offerer in order to be considered as guarantee schedules.

Any improvement or technological progress of the required equipment and accessories should be presented with necessary technical and economical information by the offerer.

If any offerer is in any doubt as to the true meaning of any part of the tender documents or wishes to make inquiries regarding the documents he should make all such inquiries addressed as follows

LETTERS:

Public Establishment for Distribution and Exploitation of Electrical Energy.
Email : register @ pedeee.com Damascus -17 Nissan St.-P.O. Box : 35199

3- DEFINITIONS:

PEDEEE shall mean public Establishment for Distribution and Exploitation of Electrical Energy.

PURCHASER shall mean public Establishment for Distribution and Exploitation of Electrical Energy.

0FFERER shall mean supplier, manufacturer

Susuccessful oferer :Shall mean the manufacturer supplier Whose offer the Purchaser has accepted.

OFFER shall mean all documents submitted byThe Supplier bidder manufacturer.

IEC International Electromechanical Commission.

4- SYSTEM DETAIL & SERVICE CONDITIONS:

- 20 kV System
- 20kV ± 10 %
- Three Phases
- Direct earthed
- Max service voltage 24 kV
- Rated frequency 50 Hz.

-short circuit level 25 KA for 20 KV
-Prevailing wind direction : north-west
-Altitude : < 1000 m
-Seismicity : 0.1 g
- environmental conditions
-Maximum ambient temperature: 55 °C
-Minimum ambient temperature: -10°C
-Average Temperature: 40°C
-Relative humidity up to 70-80% is possible.
-Wind vilocity : 35 m/s

5- STANDARDS AND NORMS:

The equipment shall be designed, manufactured and tested at works in conformity with the latest applicable IEC standards.
Whenever no IEC standards have been issued,offers shall state the available applicable standards or norms to be followed in the design, manufacture and testing of such equipment and shall enclose an English copy of them
Tender documents shall include a list covering all standards and norms to be applied for manufacture of the equipment, construction and testing. The offerer shall also specify the testing procedure to be carried out, Keeping in mind that the testing procedures proposed in these specifications are stated only as a minimum.

6- QUALITY ASSURANCE

PEDEEE attaches great importance to quality assurance by the manufacturer. In addition to witnessing the testing for the current and voltage Transformers a particular order, PEDEEE may wish to assess the in-process quality control and inspection being conduced by the manufacturer, the successful offerer will, accordingly, be required to give adequate

notice of the manufacturing and testing program for the equipment on order.
If the quality assurance program and organization have been certified by an independent authority, the tenderer shall submit all the relevant details in his tender; (e.g. ISO-Certificate)

7- OFFERER'S Background

Offerers are requested to state in their offers their experience in design, manufacture and erection of the products they have proposed, namely:
Annual capacity of production;
List of main clients (companies, establishments, etc. over the last three ears) with addresses (telex, Fax, any other details may be useful
-ScheduleNO 4: Manufacturer qualification
must be filled and signed for current and voltage transformers for 66 kv system: and it will be
evaluated technically

8- DEVIATIONS FROM DESCRIPTION:

Any respect a tenderer finds himself unable to comply exactly with all the provisions of this description and wishes to offer an alternative he shall draw attention to this in the tender under a heading Deviations from Description
Where the provision of this description differs from that of the other description or standard quoted the provisions of this description shall apply.
Wherever a reference to any standard appears in this description it shall be taken as a reference to the latest edition of the said standard. As far as it is practicable, interpretation of this clause shall be the prerogative of the PEDEEE whose decision shall be final.

9- DOCUMENTS OF TECHNICAL OFFER:

A complete technical offer shall include three copies of the following documents in English:

9-1 -Tender schedule of guarantee duly completed and signed by the offerer and the manufacturer.
9-2- ALL required information
9-3- any improvement of technological progress of the Required equipment or accessories with Necessary technical and economical information
9-4 advantages of the offer specially the specification, which are not mentioned in the guarantee schedule.
9-5 Test certificates, routine and type test reports and testing procedure for offered equipment, accessories and all material used in their constructions.
9-6 Copies of latest edition of applicable IEC standards
9-7 Details about quality assurance program.
9-8 Quality assurance certificate by an independent authority.
9-9 Deviations from tender description.
9-10 Instruction books for installation, operation and maintenance
9-11 Reference list:
- Manufacturer experiences.
- Annual capacity production.
-Main clients.
-Any other details may be useful.

9-12 Guarantee.

10- Instrument Transformers :

The instrument transformers shall be with cast-resin insulation.

Voltage transformers shall be single-pole and will be installed in the incoming and measuring cubicles.

Important NOT :

The ratio burden and accuracy shall be according to the requirements imposed in the gurantee schudels to comply with the protective relays and instrumentation given in the attached drawings, which show the single-line diagram of different feeders too .

1- Design Data :

The design data for the 20 KV cubicles where the the voltage and current transformers will be fitted are as follows :

ITEM	DATA	UNIT	(20) KV
1	Highest system voltage	KV	24
2	Nominal system voltage	KV	20
73	Lightning impulse withstand voltage 1.2/50 micro sec. a) to earth and between phases b) across the isolating distance	 KV (peak) KV (peak)	 125 125
4	Power frequency withstand voltage a) to earth and between phases b) across the isolating distance	 KV KV	 50 50
5	Rated current of : -bus bar -incoming feeder -outgoing feeder -incoming feeders for -capacitor bank	 A A A A A	 1250 1250 630 630 630 A and capable to disconnect the capacitive current
6	Rated breaking current : a) sym b) A sym	KA KA	25KA at 24 KV Acc. to IEC 56
7	Rated short circuit current (1 sec)	KA	25 KA at 24 KV
8	Rated making current	KA peak	69
9	Maximum overvoltage produced during any capacitive and inductive switching duty .	P.u	< 2.2
10	System earthing		Through high value impedance (earthing TR-R)

* All ratings are for inside the cubicle at site conditions .

2) For cast -resin insulated current transformer :

The ratings and performance shall be equal to or better than the following values:

ITEM	DATA	UNIT	LOCATION
			Around 20 kv cables outsid the cubicules
1	Highest voltage	V	750
2	Ratio	A	200-400/5/5
		A	150-300/5/5
		A	1200-600/5/5
3	Burden	VA	30
4	Thermal current	KA/S	0.8/5
5	Inner and outer diameter for toroidal CTS		- Inner diameter should be suitable to fit around one phase of three phase circuit (each phase separately) with 20 kv cooper type cables 300 mm^2 cross section for the outgoing feeder, (one CT per phase around one 20 kv cable with cross section 300 mm^2) . and around one phase of three phase circuit (each phase separately- one CT per phase) with 20 KV copper cables 2x300 mm^2cross section for the incoming feeder ,(one CT per phase around 20 kv cables with cross section 2x300 mm^2 (double circuit)) - Outer diameter: According to the design requirments

13 - TECHNICAL SPECIFICATION FOR CUBICLES WHERE THE VOLTAGE **AND CURRENT TRANSFORMERS WILL BE FITTED ARE AS FOLLOWS :**

General

The 20 kV switchgear is of metal-clad type, indoor conventional or compact design, located in a separate room of control building of the substation. It is of single bus-bar system, double-row alignment, provided with a busbar sectionalizer as it is stated on the attached drawings.

Metal clad cubicles:

The switchgear is made up of separate cubicles. They are of indoor-type, tested and factory-assembled units with identical outside dimensions. The cubicles are with draw-out circuit breakers design with suitable interlocks and automatic devices to prevent contact with live parts under all operating and service conditions. The degree of protection for enclosures is IP 41 (IEC 529). All components of the cubicle shall withstand the extreme thermal and dynamic stresses of a three-phase arc-fault.

A complete cubicle should be subjected to an internal arcing test (25 kA for the longest protection fault clearance time) in accordance with IEC 298 Annex AA1. The design of the pressure relief flaps is such that all hot gases are exhausted away from the front of the panel.

Each cubicle is subdivided into separate compartments in order to ensure safety operation and maintenance. At the operator's side .

The relay compartment is with separate door .

Cable compartment shall accommodate cables of different sizes up to 3 x 1 x 300 sq mm for outgoing and 3 x 2 x 300 sqr for incoming feeder.

Capacitive high-voltage neon indicator lamps, or other types on the front of cubicle is installed.

The cubicles is equipped with earthing devices to ensure safety operation and maintenance, according to IEC 298.

Each type of the cubicles is included at least the equipment as per attached drawings, so that to ensure the proper and reliable operation.

The cubicles are equipped under-frequency equipment for load shedding to be connected to outgoing feeders

The cubicles are incompliance with IEC 694 and IEC 298 standards in all respects.

In particular, the cubicles shall comply with the latest IEC 298 requirements regarding internal are tests.

Circuit breaker:

The 20 kV circuit breakers is SF6, or vacuum type suitable for rated breaking current and the technical data stated in design data (table in clause). They are incompliance with the requirements of IEC 298, IEC 517, IEC 56, IEC 1233
In the event of a failure to latch in the closed position, it shall not be possible for the circuit breaker to open, except at normal tripping speed.
The operating mechanism indicates whether the circuit breaker is open or closed.

Instrument transformers:

The instrument transformers shall be with cast-resin insulation.

Voltage transformers shall be single-pole and installed in the incoming and measuring cubicles. with ratio: 20 000/√3, 100/√3, 100/√3.

The ratio burden and accuracy shall be according to the requirements imposed by the protective relays and instrumentation given in the attached drawings, which show the single-line diagram of different feeders too .

Current transformers:

Accuracy class according to the IEC standards, but not less than:
0.5 for measuring winding
5 P 10 for protection winding

Ratio :
- feeder cubicles 2 x 150/5/5 A 50% of feeders
  2 x 200/5/5 A 50% of feeders
- Transformer and sectionalizer cubicles
  2 x 600/5/5/5 A

13- Current Transformers :

The current transformers shall be tested in accordance with IEC 185 .

Routine Tests :

a - Verification of terminal markings.
b - Power frequency tests on primary windings.
c - Power frequency tests on secondary windings.
d - Over voltage inter-turn test.

e - Current error and phase displacement tests.

Type Tests :

a - Short time current tests.
b - Temperature rise tests.
c - Impulse tests.
d - Accuracy tests.
e - Wet test for outdoor type transformers .

Site Testing :

a - Measurement of insulation resistance.
b - Polarity check/terminal marking check.
c - Ratio measurement.
d - Saturation voltage.

14- Voltage Transformers :

The voltage transformers shall be tested in accordance with IEC 186 with the latest revision thereof.

Routine Tests :

a - Verification of terminal markings.
b - Power frequency tests on primary windings.
c - Power frequency tests on secondary windings.
d - Voltage error and phase displacement tests.
e - Applied high-voltage power frequency dry withstand tests on primary voltage.

Type Tests :

a - Temperature rise tests.
b - Impulse voltage tests.
c - Power frequency voltage tests.
d - Accuracy tests.
e - Wet test for outdoor type transformers .

Site Testing :

a - Measurement of insulation resistance.
b - Polarity check/terminal marking check.
c - Ratio measurement.
d - Gap measurement.

1 -Guarantee Schedule For cast -resin insulated Voltage Transformers (20) kV

(To be filled-in and signed for each type and voltage)

Item	Description	Unit	REQUIRMENTS	OFFER VALUE
			20 kV	20 kV
1	Manufacturer / country			
2	ISO 9001 certificate	Yes/No	Should be submitted	
3	Type designation			
4	Rated frequency	Hz	50	
5	Highest system voltage	kV	24	
6	Rated insulation level			
6.1	Power frequency withstand voltage	kV	≥ 50	
6.2	Impulse 1,2/50 micro-sec withstand voltage	kV (peak)	≥ 125	
7	Rated voltages :			
7.1	Rated primary voltage	V	20 / √3	
7.2	Rated secondary voltage	V	100/ √3	
8	Rated output/accuracy class Two coils		≥ 30 / 0.5- 3P	
9	Voltage factor			
10	Rated ratio			
11	Ratio error with rated output and - 105% normal primary voltage - 5% normal primary voltage	%		
12	Ratio angle error with rated output and : - 105% normal primary voltage - 5% normal primary voltage	Degree	≤ 1	
13	Rated capacitance	pF		
14	Method of suppressing Ferro resonance			
15	Creepage distance	mm		
16	Flash-over distance	mm		
17	Dimensions (length x width x hight)	mm	175x350x300 +5%* * **It should not be exceeded the above mentioned dimensions**	
18	Total weight	Kg		

19	Applied standard specifications			

* the above mentioned dimensions in item No 17 are for the existing voltage transformers the required dimentions of voltage ransformers should be suitable to be fitted in the same space of the existing one with minimum modifications .
see attached drawing of dimentions of voltage ransformers .

2 - GUARANTEE SCHEDULES For toroidal cast -resin insulated current transformers

(To be filled-in and signed for each type and ratio)

Item	Description	Unit	REQUIRMENTS	OFFER VALUE
			20 kV	20 kV
1	Manufacturer / country			
2	ISO 9001 certificate	Yes/No	Should be submitted	
3	Type designation			
4	Highest system voltage	kV		
5	Insulation material			
6	Rated insulation levels :			
6.1	Lightning impulse withstand voltage - 1,2/50 micro-sec	kV (peak)		
6.2	One minute power frequency withstand voltage	kV (rms)		
7	Rated primary current :			
	a) For outgoing feeder bay	A A	150-300/5/5 200-400/5/5	
	b) For incoming and coupling feeders	A	1200-600 /5/5	
8	Rating of secondary windings :			
	a) - Rated current	A	5	
	b) - Rated output/accuracy class : - core 1 (measuring) - core 2 (protection) - core 3 (protection)	 VA VA VA	**SEE SCHEDULE NO (2)**	
9	Overload capacity at 45 °C ambient temperature	%	≥ 120	
10	Cree page distance	mm		
11	Flash-over distance	mm		
12	Dimensions: (length x width x height) **and inner and outer diameter**	mm	**SEE SCHEDULE NO (2)**	
	For outgoing feeder	mm		
	For incoming feeder	mm		
13	Total weight	Kg		
14	Applied standard specifications			
15	Turns ratio - Core 1 - Core 2 - Core 3			

3 - Guarantee Schedules for cast -resin insulated Current Transformers (20) kV

(To be filled-in and signed for each type and ratio)

Item	Description	Unit	REQUIRMENTS 20 kV	OFFER VALUE 20 kV
1	Manufacturer / country			
2	ISO 9001 certificate	Yes/No	Should be submitted	
3	Type designation			
4	Highest system voltage	kV	24	
5	Insulation material			
6	Rated insulation levels :			
6.1	Lightning impulse withstand voltage - 1,2/50 micro-sec	kV (peak)	≥ 125	
6.2	One minute power frequency withstand voltage	kV (rms)	≥ 50	
7	Rated primary current :			
	a) For outgoing feeder bay	A A	150-300/5/5 200-400/5/5	
	b) For incoming and coupling feeders	A	1200-600 /5/5/5	
8	Rating of secondary windings :			
	a) - Rated current	A	5	
	b) - Rated output/accuracy class : - core 1 (measuring) - core 2 (protection) - core 3 (protection)	VA VA VA	See schedule NO (2)	
9	Overload capacity at 45 °C ambient temperature	%	≥ 120	
10	Creepage distance	mm		
11	Flash-over distance	mm		
12	Dimensions: (length x width x hight)	mm		
	For outgoing feeder	mm	(195 x340x 350)+5%* **It should not be exceeded the above mentioned dimensions**	
	For incoming feeder	mm	(195 x400 x350)+5% * 195x400x370 **It should not be exceeded the above mentioned dimensions**	
13	Total weight	Kg		
14	Applied standard specifications			
15	Turns ratio - Core 1 - Core 2 - Core 3			

* the mentioned dimensions in item No 12 are for the existing current transformers the required dimentions of current ransformers should be suitable to be fitted in the same space of the existing one ..see attached drawing of dimentions of current ransformers .

4- **Manufacturer qualification**

Tnder No. ( ) Manufacturer qualification form for Equipment ((66) kV system current and voltage transformers)			
		Description	Offered Data
General	1.1	Type (model)	
	1.2	Manufacturer / country of origin	
	1.3	Manufacturing country /factory location	
	1.4	Date of foundation the factory	
	1.5	Manufacturers address	
	1.6	If equipment Manufactured under license, give name and country of licensor	
	1.7	List of similar equipment Manufactured by you during the last five years .	
	1.7.1	National : a) No. of equipments b) total value of equipment	
	1.7.2	International : a) No. of equipment b) Total value of equipment	
Technical and financial	2.1	Date of starting production:of the equipment	
	2.2	Total quantity of offered equipment produced of the same type	
	2.3	Enclose list of main clients during last 3 years	
	2.4	Approximate annual turnover of the Manufacturer during last 3 years	
Quality	3.1	Do you have quality department ? to whom it reports .	
	3.2	Are you qualified to ISO 9001, enclose certificate.	
	3.3	Date of qualification and validity.	
	3.4	Do you maintain comprehensive records of manufacturing, inspection and test .	
Testing	4.1	Do you have routine test facilities.	
	4.2	Do you have type test facilities	

Important Note to the Bidder :

1- this form must be filled and signed for (66) kV system current and voltage transformers:

Manufacturer : _____ Bidder :_____

Signature : _____

5- Schedule of Prices for voltage and current transformers :

DESCRIPTION	QUANTITY	Unit Price FOB	Unit Price C+F	Total Price FOB	Total Price C+F
20 kv voltage transformers	**50**				
20 kv current transformers	**260**				
Rated primary / secondary(5A) current:					
600-1200/5/5/5	**20**				
200-400/5/5	**50**				
150-300 / 5 /5	**70**				
50-100/5/5	**20**				
100-400/1/1	**50**				
150-300/1/1	**50**				
Toroidal cast -resin insulated CTs					
600-1200/5/5/	**40**				
200-400/5/5/	**30**				
150-300/5/5/	30				
Residence expenses a broad for two PEDEEE engineers for one week for testing of equipment.	**2MAN/WEEK**				
Total					