

Our Ref :  
Date :

**Messrs:**  
Dear Sir,

**Tender 25/2020**  
**Main Transformers**

You are kindly requested to quote for the supply and delivery DDP to our stores the transformers detailed in the attached schedules and conditions stated in this tender.

The transformers will be required to operate satisfactory at altitudes varying from 400 meters below sea level to 850 meter above sea level and in max. Temp. of 50C and min. temp. of 5 C below Zero.

All transformers shall be of low losses type, the winding material shall be made from high grade electrolytic copper. Formula for losses is attached, and this will be applied in evaluation.

The design and construction of the transformers shall be in accordance with the latest IEC recommendation.

All materials should be of the best quality and suitable for tropical conditions. The on-load tap changer type should be MR or ABB Europe manufactured and must be suitable for daily operation on the load during the transformer life.

Every tender should be accompanied with three copies of catalogues and detailed drawings. After the awarding of this tender, the contractor should undertake to submit details plans, wiring diagrams, installation instructions, etc. for our formal approval and later execution.

Bidders can offer materials which are slightly different from the requirements specified, if it forms more modern or advanced improvement. The company shall be at liberty to order part of this tender, or change the quantities required and does not bind itself to accept any or the lowest prices.

**Essential Bidding Requirements:**

- A bank certified check or a bank guarantee of 5% of the total tender valid for 90 days, to be submitted as a bid bond, otherwise, quotation will be neglected.
- Quotation should be enclosed in a sealed envelope or package and handed over to the "Tender Committee" by the representative of the bidder or their agent not later than 5.11.2020 at 11:00 AM.
- TENDER DOCUMENTS FEES: 500 US\$. A proof of payment should be sent by email to : rnashashibi@jdeco.net.

- The main offer envelope or package should include three separate envelopes as follow :
  - a. The financial offer in a separate sealed envelope.
  - b. The technical offer & catalogues placed in a separate sealed envelope.
  - c. Your bid bond in a separate envelope.
- Technical offer will be studied separately from the financial offer. The financial offers for bidders whose technical offers do not meet JDECO's technical requirements will not be opened.
- In case offers are submitted by an agent on behalf of a certain supplier, a copy of the agreement between the agent and the supplier must also be submitted. Such copy has to be authenticated and certified by the chamber of commerce at the supplier's country of origin.
- Offers have to be attached with a letter confirming the authorized persons signing on behalf of the bidder.

Any bid package not according to the above will not be considered.

Payment method in case of offer acceptance:

- 90 days after delivery of goods through bank transfers.
- The currency of the suppliers' invoices must be the same as the currency of their submitted offer and as specified in the letter of award, otherwise they will not be accepted.

Notes:

- The company has the liberty not to accept any or the lowest tender neither to assign any reason for rejection of any tender.
- The accepted bidder will be charged the expenses of the tender's advertisement in the local newspapers.
- Upon acceptance of offer the bidder will be requested to submit a Performance Bond equivalent to 10% of the tender total value, and should be valid for ...30..... working days from the date of executing all terms of contract.

*Yours faithfully,*

**Hisham Omari**  
**Board Chairman &**  
**Managing Director**

## **Tender 25 /2020** **Technical Details**

**Item 1 :** Two units of 15 MVA 33/11 kV 50 Hz outdoor T/F with on load tap changer operated automatically by an automatic voltage regulator mounted in an indoor cabinet to keep the secondary voltage within pre-selected limits.

### **Details of on load tap changer (OLTC), Motor Drive & Voltage Regulator (AVR)::**

- 1/1 Transformer should be supplied with an on load tap changer (OLTC) type MR or ABB Europe. The bidder should supply details of the tap changer offered, together with catalogues and drawings.
- 1/2 Accessory equipment for tap changer should include the following on the transformer:
- a- Operation counter
  - b- Safety switch interlocked with hand crank
  - c- "Remote-Local" selector switch
  - d- Local "raise-lower" control switch
  - e- Buchholtz relay
  - f- Pressure relief valve
  - g- Oil level indicator
  - h- Indoor cabinet for tap changer relay and auxiliary control circuits (Tap changer position meter, L/R switch, indication lamps, ...etc)

The motor drive unit of the OLTC must be installed in a rigid control cabinet, protection class IP 66, made of 4 mm thick aluminum alloy and equipped with padlock facility. The transmission gear of motor drive shall be of belt-type drive. After the door of the motor drive unit is opened, no voltage-carrying components must be able to be touched. A rigid aluminum pocket for storing the concerned circuit diagram shall be securely fixed on the inner side of the front door. An innovative LED hand lamp for the illumination on the internal side of the motor drive must be provided, which lights up when the panel door is opened.

Details of Automatic Voltage Regulator (AVR):

Each transformer should be supplied with (AVR) controller to control the driving mechanism of each (OLTC) operation to keep the secondary terminal voltage within pre-selected limits irrespective of loading.

The input voltage of the AVR from The potential transformer is 110 V AC.

The power supply for the AVR relay is 110V DC

The tap changer motor supply voltage is 400V L-L three phase

AVR should have abnormal control response functionality.

The (AVR) with its accessories should be enclosed in a cabinet made from 2mm sheet galvanized steel and to be designed for indoor floor mounted installations with the following facilities:

- 1- Tap changer position indicator
- 2- Automatic – Manual Operation Selector Switch Raise – Lower
- 3- Raise Lower for Tap-Changer Working
- 4- Main Power Supply for A.C & D.C and other facilities you find necessary to be added.
- 5- Selector switch for master, slave, independent working
- 6- Facilities shall also be provided to prepare the transformer for operator with one or more transformers on the master-slave principle.

## 2. Accessories:

Each transformer must have the necessary fittings and accessories which must include the following:

- a- Conservator tank complete with all accessories.
- b- Silicia Gel dehydrating breather in a convenient floor height. A stainless steel filter at the bottom shall protect the silica gel chamber against external environment influences.
- c- Double gap arcing horns on both sides
- d- Bucholz relay device with "Gas-Alarm" and "Surge-Trip" contacts and arrangement.
- e- Pressure relief device. The trip contacts (IP65) – with an operating time within 2ms - must be directly activated by a self locking pin. All important parts like trip contacts, springs... must be mounted inside (under the aluminum cover).
- f- Winding temperature indicator with alarm and trip contracts and max rest pointer. The view glass must be laminated safety glass with a UV-filter.
- g- Oil temperature indicator as in Item f.
- h- Connection box all the pilot cable termination.

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- i- Remote tap position indicator, thermometer pocket, oil level indicator, lifting, jacking haulage, facilitate, tank earthing mark, oil fitting facilities.
  - j- Outdoor metal cover to protect the bushings from being short circuited by any animal.  
A solid cover made from non-corrosive aluminum must be used as the protection against accidental touch of the drive shaft arrangement between motor drive unit and OLTC.
  - k- HV bushings insulation should be at least 40kV. LV bushings insulation should be at least 20kV.

### 3. Loading, Site, Altitude and Weather:

Transformer should be capable of continuously operating at 112% of nominal rating with 60C rise of resistance without any loss of its life.

Transformer should operate satisfactory in the following conditions:

- a- Site – Jerusalem Area
- b- Altitude – above sea level 850 meter
- c- Weather – Lowest Temp. 5C below zero.  
Highest Temp. in shade 50C taking in mind that the transformer  
Will be in open air and exposed to the sun.

### 4. Tests:

As shown on the attached sheets of schedule (B) the company demands to witness testing of these transformers.

### 5. Transformer Design:

#### 1. Electrical systems and fault levels:

The transformers shall be suitable for continuous operation on a three phase 50 Hz, at the nominal voltages specified: 33 kV, 11 kV

The system highest voltages are 10 percent in excess of the nominal voltages 36 kV, 12 kV.

The nominal design 3-phase fault levels of the systems will be

33 kV : 16 KA  
11 kV : 20 KA

## 2. **Insulation Levels:**

The impulse withstand levels of transformers shall be designed according to IEC standards and not lower than the following when tested in accordance with IEC.

33 kV	: 195 kV
11 kV	: 95 kV

## 6. **Losses and Evaluation:**

The bidder shall state in the schedule of particulars and guarantees guaranteed values for component losses (i.e. no load loss, load loss at CMR)

The maximum allowed No-load loss is 11kW + 0%

The maximum allowed Load loss is 80kW + 0%

Impedance voltage is: 10%

Maximum allowed magnetizing current at HV side is 0.3%

Transformers exceeding the maximum allowed losses mentioned above will be rejected. No tolerance is allowed.

## 7. **Temperature rise:**

The temperature rise of the transformers must not exceed 50/55C deg as a result of temperature rise test according to IEC standards.

## 8. **Noise level:**

The noise level of the transformers should not exceed 50 dB at 0.3 meter when tested according to IEC standard.

## 9. **Transformer bushings cover and cable glands:**

The HV and LV bushings of the transformers must be covered with two separate boxes to prevent access to transformer bushings and cable terminations.

a- HV side cover:

Three cable openings with cable glands suitable for cable of type N2XS(F)2Y 150mm<sup>2</sup> cross section

b- LV side cover:

7 cable openings with cable glands suitable for cable of type N2XS(F)2Y 300mm<sup>2</sup> cross section.

**Tender 25/2020**

**Table "A"**

**General particulars & Guarantees**

**Blanks to be filled by Bidders**

<i>No.</i>	<i>Description</i>		<i>Details</i>
01.	Continuous Max. Rating	MVA	15
02.	Normal Transformation Ratio	KV	33/11
03.	H.V. Side	KV	33
04.	L.V. Side	KV	11
05.	Frequency	HZ	50
06.	Mounting Arrangement		Outdoor, Floor
07.	No. of Phases		3
08.	Phase a- H.V. Winding. b- L.V. Winding. c- Vector Group of Main Winding		Delta Star DYn 11
09.	Cooling		ONAN
10.	Voltage Control		On Load
11.	Range of Voltage Control		±15%
12.	Size of Step		2.5%
13.	Voltage of Star Point to Earth		Full Line Voltage
14.	Line Terminal: a- H.V. (3ph). b- L.V. (3ph & N)		Porcelain Bushings
15.	Supply Voltage Available	Ac Dc	
16.	Type of core material		
17.	Method of core clamping		
18.	Max. Flux Density Cores Yoke	Tesla Tesla	
19.	Magnetizing Current H.V. Side	%	
20.	No. load losses at normal ratio	KW	
21.	Load Losses at full Load and Ratio 33/11 KV	KW	

22.	Load for Max efficiency 33/11 KV	MVA	
23.	Max Efficiency	%	
24.	Regulation at full load a- unity p.f. b- 0.8 p.f.	% %	
25.	Impedance Voltage at full load & 75C Bet H.V. & L.V. 33/11 KV (around 10%)		
26.	Min. crepage path of H.V. Bushing (around 100 )	Cm	
27.	Min. crepage path of L.V. Bushings	Cm	
28.	Max and min. air gap of the double gap arcing horns on H.V.	Cm	
29.	- Ditto - but for L.V. Side	Cm	
30.	Thickness of transformer tank	Cm	
31.	Dimention: Height, Length , Width	Cm	
32.	Weights: a- Core b- Windings c- Oil d- Transformer for transport. e- Total weight.	Ton Ton Ton Ton Ton	
33.	a- volume of conservator (liters). b- volume of oil in conservator (liters).		
34.	Size of dehydrating breather		



## **Tender 25/2020** **Schedule "B" Tests**

The following tests are to be conducted.

### **WORK TESTS:**

#### **1. Summary of Tests:**

- A- Transformers – Routine and type tests.
- B- Voltage Control Equipment – Routine and Type Tests.
- C- Magnetic Circuit – Routine Tests.
- D- Cable Boxes and disconnecting Chambers – Routine Tests
- E- Porcelain Insulators – Routine, Sample and Type Tests to IEC. 168.
- F- Complete Outdoor Bushing Assemblies – Routine, Sample and Type to IEC 137.
- G- Tanks – routine Testes and Type Tests.
- H- Cooling Plant – Routine and Type Tests.
- I- Gas and Oil – Actuated Relays – Routine and Sample Tests.
- J- Galvanizing Routine Tests.

#### **2. Transformers**

##### **A- Routine Tests:**

All transformers shall be subjected to the following routine testes in accordance with IEC. 76.

- 1- Measurement of Winding Resistance.
- 2- Ratio, polarity and phase relationships.
- 3- Impedance Voltage.
- 4- Load Loss.
- 5- No load loss and no load current.
- 6- Induced over voltage withstand.
- 7- Separate source voltage withstand.
- 8- Insulation resistance.

##### **B- Type Tests:**

Temperature – Rise Test:

The test shall be in accordance with IEC. 76 and shall be carried out on one main power transformer.

Temperature – Rise Tests shall be conducted on the tapping corresponding to the maximum losses.

C- **Noise Level Test:**

The test shall be in accordance with latest IEC standard and shall be carried out on one main power transformer.

D- **Special Tests:**

**Impulse – voltage withstand tests:**

These shall be made on each transformer and shall include the following requirements:

- 1- The transformers shall have been subjected to the above routine tests prior to the impulse-voltage withstand test and those transformers subjected to the temperature – rise test shall be impulse tested as soon as practicable thereafter.
- 2- The procedure shall be as required by IEC. 76-1979 clause 46 the impulse test voltages being applied successively to each line terminal. Negative polarity is to be used throughout the tests.
- 3- The sequence of voltage applications shall be:
  - A – Impulse calibration test at 75 percent of the specified full wave voltage.
  - B – One 100 percent full wave voltage application.
  - C – Two 100 percent minimum chopped wave voltage application.
  - D – One 100 percent full wave voltage application.

- Oscillographic records of the applied voltage and neutral current and/or transferred voltage are to be taken and included in the records.
- Films of the oscillographic records are to be made available to the engineer at time of the tests for his examination.
- External flashover of the bushings during the chopped wave tests is NOT permitted.

**Zero Phase Sequence Impedance Measurement:**

This test shall be in accordance with IEC. 76 and shall be carried out on each transformer.

3. **Voltage Control Equipment:**

**Routine Tests:** Each finished tap changer is to be subjected to the mechanical and dielectric routines tests, specified in IEC. 214.

**Type Tests:** Shall be carried out entirely in accordance with IEC. 214.

**Magnetic Circuit:**

4. **Routine Tests:** Each core completely assembled is to be tested for one minute at 2500 volts a.c. between core bolts, side plates, structural steel works and core and coils stage. After the transformer is tanked and completely assembled, a further insulation measurement test is to be applied at 500 Vd.c between the core and the earthed structural steel works to prove that the core is earthed through the removable link at one point only.
5. **Cable Boxes and Disconnecting Chambers:**  
**Routine Tests:** to meet the requirement.
6. **Porcelain Insulators:**  
The following tests are to be made on not less than 2 percent with a minimum of two, of the porcelain insulators of each type in the contract.
  - A- Temperature Cycle Tests.
  - B- Porosity Test.
7. Complete Outdoor Bushing Assemblies with Porcelain Insulators  
**Routine tests to include:**
  - A- Oil leakage test.
  - B- Voltage test.
  - C- Power Factor – Voltage Measurements.  
**Type tests to include:**
  - A- Dry withstand and flashover voltage tests.
  - B- Visible Corona test.
  - C- Wet voltage withstand test.
  - D- Wet flashover test.
  - E- Impulse voltage test.
  - F- Flashover under oil test.
8. **Tanks:**  
**Routine Tests:**  
A – Oil leakage – All tanks, conservators and oil filled compartments which are subjected in service or during maintenance to oil pressure are to withstand without leakage, a hydraulic pressure test equal to 69 KN/m<sup>2</sup> or the normal pressure plus 34 KN/m<sup>2</sup> whichever  
**Type Tests:**  
Unless Type Test Certificates can be produced for tests carried out on similar equipment, the following tests are to be included for tanks, conservators and pressure relief devices.

- A. **Vacuum Test** – The equipment is to withstand effectively full vacuum (25m bar absolute pressure) when empty of oil. The permanent deflection of plates or stiffness on removal of vacuum is not to exceed the following values.

Length of Plate	Permanent Deflection
Less than 1300 mm	3.17 mm
1300 to 2500 mm	9.5 mm
Greater than 2500 mm	12.7 mm

- B. **Pressure Test** – the equipment is to withstand a pressure corresponding to 69 KN/m<sup>2</sup> or the normal pressure plus 34 KN/m<sup>2</sup> whichever is the greater. The permanent de-flections of plates or stiffeners on removal of pressure is not to exceed the values stated in respect of the vacuum test in the preceding paragraph.

9. **Gas and Oil** – Actuated Relays

**Routine Test:**

- A- Oil leakage – when subject to an internal oil pressure of 207KN/m<sup>2</sup> for 15 minutes.
- B- Gas collection.
- C- Oil Surge.
- D- Performance test under service conditions including starting and stopping of oil pumps.
- E- Voltage – 2 kV for one minute between electrical circuits and casing.

10. **Galvanizing and painting:**

Routine Tests: to the requirements of ISO Recommendations.  
Painting colour of the transformers should be RAL9006

**Tender 25/2020**  
**Schedule C**  
**Manufactured and Suppliers**

<i>Item</i>	<i>Description</i>	<i>Type</i>	<i>Manufactured</i>
1.	Transformer Complete		
2.	On Load Tap Changer		
3.	Bushings		
4.	Oil		
5.	Control Panels		
6.	Breather		
7.	C.T.		
8.	Relays		
9.	V.T.		
10.	Indicating Instruments		
11.	Core Plates		
12.	Insulating Popper		
13.	Insulating Cylinders		
14.	Copper		
15.	Core Plates		
16.	Motor Control Equipment		

**Delivery:**

1. Date of which transformer would be ready for testing.  
After Commencement date \_\_\_\_\_ Weeks.
2. Date of which transformer would be ready for delivery.  
(DDP) weeks after commencement dated \_\_\_\_\_  
Weeks.

**Date:**

**Signatures**

## Tender 25/2020

### Schedule (D)

Item	Description	Qty.	Unit Price	Total Price
1.	15 MVA 33/11 kV power T/F	2		

**Total Contract Value (D.D.P.)** \_\_\_\_\_