**Technical task**

**for the purchase of a transformer**

**1. General part**

1.3. Subject of purchase: Supply of power transformer type TDC-20000/110-U1 or equivalent, three-phase or equivalent, three-phase, three-winding, oil, with natural oil circulation and forced air circulation, with voltage regulation under load on the higher voltage side, rated power 20000 kV·A and rated voltage of HV side - 115 kV, LV side - 6.6 kV , MV side - 38 kV, for areas with a moderate climate with outdoor installation.

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| № | Denomination of the product | Type, brand, TC, GOST, № of drawing | Units | Total quantity |
| 1 | Transformer type  TDC-20000/110-U1  or equivalent | Three-winding, oil, with natural oil circulation and forced air circulation, with voltage regulation under load on the higher voltage side and the nominal voltage of the HV side - 115 kV, LV side - 6.6 kV, MV side - 38 kV, diagram and group of connection of windings Yn/Yn/D-0-11, type TDC-20000/110-U1 or equivalent according to DSTU standards, DSTU EN 60076, GOST, technical conditions that are valid in Ukraine at the moment of transformer manufacturing, including the service of supervision over mounting and delivery to the address in Odessa city. | pcs | 2 |

The product must be manufactured in accordance with the requirements of regulatory documents valid in Ukraine (state standards (DSTU), technical conditions (TC), ISO and other standards and regulations established by the current legislation of Ukraine) for this type of product.

The product must be new, undamaged, manufactured not earlier than 2022.

The product must be delivered complete with documentation in accordance with current standards, duly executed, certified by the seal of the manufacturer and the supplier (copies, samples of the documents must be provided in the Bidder's tender offer).

**2. List of necessary documents to confirm the technical and quality characteristics of the subject of purchase**

2.1. A sample of passport/certificate of quality from the manufacturer for a product of similar (or higher) power and voltage class showing technical characteristics.

2.2. A sample of operational instructions or manuals of the product, including documentation on scheduled repairs for a product of similar (or higher) capacity and voltage class transformer in Ukrainian language.

2.3. A sample of dimensional and installation drawings for a product of similar (or higher) capacity and voltage class, control cabinet diagrams (principle electrical diagram, electrical connection diagram, installation of control cables).

2.4. A guarantee letter that the product offered by the Bidder was manufactured not earlier than 2022.

2.5. A guarantee letter from the Bidder stating that the product will be accompanied by quality documents (passport and/or quality certificate from the manufacturer) upon delivery.

2.6. The Bidder must provide a reference list for the supply of at least 5 step-up transformers with a capacity of at least 400 MVA and a voltage class of at least 110 kV for the period 2012-2022.

2.7. The Bidder must provide documentary confirmation, received from the manufacturer, of the calculation (calculations) of compliance of the proposed equipment with the requirements of Table 7 "Minimum values of the maximum efficiency of liquid-filled large power transformers" of the Technical Regulation on requirements for the 1st level of eco-design for small, medium and large power transformers approved by the resolution of the Cabinet of Ministers of Ukraine dated February 27, 2019 No. 152 with all changes at the moment of submission of the proposal.

2.8. If the Bidder is not a manufacturer of this type of equipment and spare parts, the Bidder must provide an original / scanned copy of a letter from the manufacturer (on a letterhead with a stamp) authorizing the Bidder for warranty and other obligations related to delivery, adjustment, commissioning and maintenance of this type of equipment and spare parts, issued in the name of the Bidder not earlier than 30 days before the submission of the offer.

1. **Requirements and technical characteristics of the transformer**

The supplied equipment must be certified for the use in Ukraine, and proof of certification shall be provided by the Bidder. The list of technical characteristics is given below.

**Technical characteristics for the purchase of a transformer TDC-20000/110-U1**

1.The transformer must comply with DSTU EN 60076, Three windings with regulation under load and switch without excitation; the number of phases-3, climatic performance – U; installation – external; Altitude above sea level - not more than 1000м.

2. Ambient temperature from -45°C to +50°C;

3. Nominal power of the sides – HV/MV/LV 20/20000/20000kVA;

4. Nominal voltage of the sides - HV/MV/LV 115/38/6,6;

5. Voltage regulation – regulation under load on side HV±19х1,5%, switch without excitation on side MV±5X2,5%;

6. When the transformer is operating on HV branches below minus 6,0%(-4x1.5%) the power corresponds to the nominal current minus 6,0%

7. Type of cooling system – oil air forced

8. Тransformer power at cooling stages, oil air forced 22000/20000kVA;

9. Winding connection scheme and group -D/Yn-11;

10. Nominal frequency – 50Hz

11. Test voltage of internal insulation (one-minute industrial frequency, kV/full lightning impulse, kV/truncated lightning impulse, kV:

HV – 230(MF 275)/550/600;

HV neutral – 130/275/-

MV, neutral MV 85/190/220

LV – 35/75/90

12. Short-circuit voltage, % on the main tap:

HV-MV-10,5 (tolerance ±7.5%)

HV-LV – 18,0 (tolerance ±10%)

MV-LV – 7,0 (tolerance ± 15%)

13. Short-circuit losses on the main tap (HV-LV),kW, 1,15 (tolerance ±10%)

14. No-load losses at nominal excitation, kW – 45 (tolerance ± 15%)

15. No-load current, %-0.43 (tolerance ±30%); mode of operation of the neutral - blind grounding, grounding is allowed under the conditions of protection by a suitable arrester or overvoltage limiter.

16. Tolerance on the transformation factor:

- In HV-LV mode on the main branch ±0.5%

- In other modes, on minor branches ±1,0%

17. Shock coefficient of short circuit -1.8

18. The limit multiple of the largest established short-circuit current HV/LV-9,5/10,0

19. Longitudinal / transverse track, mm – 1524/2080

20. The shape of the rollers is rotary carriages with flanges

21. Built-in current transformers:

- HV -400-600/5A; 5P15-5P20-5P20-5P20; 30VA- 2 items

- LV -200-400-600/5A; 5P30; 30VA- 2 items

Neutral HV=200-300-400-600/5A; 5P15-5P20-5P20-5P20; 15-15-20-30VA – 2 items

22. Supply voltage of the control circuits of the cooling system and regulation under load, V~220 (1phase +N)

23. Supply voltage of signaling circuits, V=220

24. The supply voltage of the cooling system motors and regulation under load, V~380 (3phase +N)

25. External insulation - category IV according to GOST 9920-89 (specific length of the leakage path at least 3,1 cm/kV, neutral 232.3 cm)

26. Components:

Input HV-RIP- insulation, external insulation polymer

Neutral HV-RIP- insulation, external insulation polymer

Input LV- oil-air, external insulation porcelain

Protective equipment:

Arrow indicators of the oil level

Manometric thermometers

Protection relay regulation under load

Gas relay of the transformer

Safety valve

Flexible shell

Thermosiphon filter

Stationary ladder for maintenance

Plate radiators, fans

A set of spare parts for installation according to GOST 2.601-95

The delivery set includes silica gel, oil for topping up and for technical needs

27. Brand of transformer oil – T1500

The position of the expander on the side of regulation under load.

Delivery with oil that is poured into the transformer during transportation.

**4. Delivery period of the equipment: not more than 240 calendar days starting from the contract signing.**

**5. Packaging**

5.1. Equipment packaging must guarantee protection against mechanical damages.

5.2. Long-term storage of the equipment must be possible within the temperature range from - 45°С to + 40°С with no impact on the equipment’s quality.

5.3. Inspection of labeling and packaging must be available - after delivery.

**6. Supervision (to be included in the agreement)**

In order to ensure the quality of the installation and the reliability of the equipment operation, the Supplier guarantees the presence and participation of the supervisors of the transformer manufacturing plant, and if necessary, the supervisors of manufacturers of other equipment, at the stage of installation, adjustment and testing of the equipment to provide technical guidance, qualified and prompt resolution of all technical issues that arise in the process of installation, adjustment, testing with the preparation of all necessary documents within the terms to be determined by the Customer's (Recipient’s) written application.

The supervision provides:

- the instruction for the Customer's (Recipient’s) personnel and the personnel of the Contracting company, which will perform the installation, on the performance of installation works;

- the acceptance of the equipment and its component parts together with the Customer (Recipient) "in terms of quality" before installation;

- the inspection of the equipment prior to installation with the provision of an inspection report and installation permit;

- the control of the correctness and quality of installation and tests for the entire period of work;

- the issuance of a written permission to put the equipment into operation.

The supervisor controls and is responsible for the performance of transformer assembly, installation, adjusting tests and equipment commissioning.

**7. Warranty**

After installation and testing of the equipment, the Supplier issues a warranty. The warranty period is at least three years from the date of putting the transformer into operation. During this warranty period, the Supplier shall, at its own expense, repair all defects and repair any part of the equipment that has been properly installed and operated, but fails during the warranty period due to design defects or manufacturing defects attributable to the Supplier. The terms of the warranty apply to the equipment that has been repaired or replaced, starting from the time of repair or replacement. The Supplier is also obliged to eliminate at his own expense all deficiencies and defects discovered during the installation and testing of the equipment.

In the event of a warranty case, the Supplier must ensure the arrival of manufacturer’s representatives to the place of installation of the transformer within five working days from the date of the official request of the Customer (Recipient);

In the event of a warranty case, the Supplier must provide a full range of repair work and the necessary tests of the transformer at its own expense within the timeframe agreed with the Customer (Recipient).

**8. Terms and conditions of product acceptance: (to be included in the agreement)**

- the acceptance of the transformer by the Customer (Recipient) is carried out at the place of delivery or at the place of manufacturing

- the acceptance of the transformer must be provided with the technical support of the responsible representative of the manufacturer.

**9. Terms and conditions of the product storage (to be included in the agreement):**

The Bidder must ensure the supply of the transformer with the possibility of storing it before installation for at least 12 calendar months from the date of signing the invoice with the requirements of compliance with the manufacturer's storage conditions.

**10. Documentation provided upon the delivery (to be included in the agreement)**

10.1 Details of configuration

10.2 Instructions for transportation, unloading, storage, installation and commissioning of the transformer in Ukrainian language, (yes, no), number of copies 2

10.3 Dimensional and installation drawings of the transformer, diagrams of the control cabinet (principle electrical diagram, diagram of electrical connections, installation of control cables), (yes, no), number of copies 2.

10.4 Table of short-term emergency overloads

10.5 Instructions or manual for the operation and maintenance of the transformer and its components, including documentation on planned repairs of the transformer in Ukrainian language, (yes, no), number of copies

10.6. Grounding scheme of the active part

10.7. Protocols (acts) of the factory acceptance tests

10.8 Programs and methods of control, tests

**11. Transportation, storage conditions (to be included in the agreement)**

11.1 Delivery of the transformer on Joint-Stock Company «Odessa CHP» basis in accordance with Incoterms 2020 at the delivery address, which includes transportation of the transformer and unloading at the delivery address.

11.2 The presence of shock indicators to control transportation conditions.

11.3 The availability of technical support for acceptance, joint acceptance with the supplier.

11.4 The equipment packaging must indicate (yes, no):

- order number;

- trademark;

- name of the manufacturing company;

- conditional mark;

- gross weight in kg;

- date of manufacturing (year, month).