

**CITY OF NICHOLASVILLE**

**REQUEST FOR SEALED BIDS**

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**The City of Nicholasville hereby request sealed bids for The City of Nicholasville Electric Department for One (1) each 33 MVA 69kV/13.8 Power Transformer. Sealed bid to be provided in accordance with terms, conditions and specifications established herein.**

**Sealed bids will be received at City Hall, 517 North Main Street, Nicholasville, Ky, 40356, 12:00 Noon, on Thursday, June 7, 2018.**

**Sealed bids received after the date and time set for bids will not be considered, and will be returned to the bidder. It is the sole responsibility of the bidder to assure that his/her sealed bid is received at City Hall, 517 North Main Street, Nicholasville, KY, 40356 on or before June 7, 2018 at 12:00 Noon.**

**Sealed Bids must be in an envelope and the envelope prominently marked:**

**"Nicholasville Electric Bid 2018-135"**

**If mailed, the envelope must be addressed to:**

**City of Nicholasville  
Bid:2018-135  
Pauline Horsley, Purchasing Agent  
517 North Main Street  
Nicholasville, Ky 40356**

**Additional copies of this Request for sealed bids are available. Contact Pauline Horsley at 859-885-1121, extension 263.**

**The City of Nicholasville reserves the right to reject any and all bids and to waive any minor informality in bids received.**

**BID:2018-135**

**City of Nicholasville  
Electric Department  
Bid #2018-135  
33 MVA Power Transformer**

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**1. General Description:**

- (a). Scope:  
33 MVA Power Transformer, Phase Three, Capacity 20/26/33 MVA  
(OA/FA1FA2) Voltage 67000 - 13,800/7967V
- (b). Applicable Standards:  
The transformer covered by this specification will be designed and  
manufactured in accordance with ANSI C57.12.00Std.
- (c). Service Conditions:  
The Transformer will be suitable for operations at its ratings under the  
following service conditions:  
Maximum ambient air temperature 40 deg C  
Maximum altitude above sea level 1000 meters  
Annual mean ambient temperature 30 deg C  
Maximum ambient relative humidity 88%  
Maximum wind velocity 240 km/hr  
Maximum seismic factor 0.45g

**2. Type:**

- (a). Oil-Immersed, self-cooled (OA)/forced-air-cooled (FA) suitable for outdoor  
installation

**3. Ratings:**

- (a). Number of phase Three
- (b). Rated output 20/26/33 MVA (OA/FA1/FA2)
- (c). Rated Voltage
  - 1. High Voltage 67000 V
  - 2. Low Voltage side 13, 800 V Line-Line/7,967 V Line-Neutral
  - 3. H.V Tap voltage 67000 V + - 2 x 2.5%
- (d). Rated frequency 60 Hz
- (e). Connections
  - 1. High Voltage Delta
  - 2. Low Voltage Star with Neutral brought out
- (f). Polarity/Vector group Dyn1 (30 C Angular displacement)

#### 4. Electrical Performance:

- (a) At rated voltage, frequency, unity p.f., and 75 deg C (@ 20 MVA base)
  - 1. No-Load Loss 24KW
  - 2. Load Loss 67KW
  - 3. Efficiency 99.5%
  - 4. Exciting Current 2.0%
  - 5. Voltage Regulation 0.7%
  
- (b) Temperature rise
  - 1. Insulating oil 65 deg C
  - 2. Windings 65 deg C
  
- (c) Dielectric strength
  - i. Applied voltage (for 1 minute)
    - 1. H.V - L V E. 140 kv
    - 2. L.V - E. 38KV
  
  - ii. Bil: Impulse 1.2/50 microseconds (kV) crest
    - 1. H.V windings 350 kV
    - 2. L.V. windings 110 kV

#### 5. Constructions:

- (a) Core: The core of the transformer will be constructed of the highest quality, non-aging high permeability, cold-rolled grain-oriented silicon sheet especially suitable for the purpose. Every care will be taken during slitting and cutting process to avoid burrs. Both sides of each sheet will be special glass film insulated on to minimize eddy current losses. The cores will be carefully assembled and rigidly clamped to ensure adequate mechanical strength to support the windings and also reduced vibrating to minimum under operating conditions.
  
- (b) Windings: The winding for the transformer shall be made of high tensile strength electrolytic copper of high conductivity (Class A, in accordance with ANSI) and insulation, material of high quality shall be free from burrs, scales and splinters.

The tank, conservation, coolers and bushings shall be adequately braced to withstand ocean shipment, and earthquake with seismic coefficient of 0.45 g (horizontal).

- (c) Short Circuit Withstand Capability:  
The transformer shall withstand the combined effects of thermal, mechanical and electromagnetic stresses rising under short-circuit conditions based on the maximum durations of fault:

High Voltage Winding: 2 seconds

Low Voltage Winding: 2 seconds

For design purposes, the following network data shall be taken into consideration. The available system fault currents as follows (in rms):

67 KV :  $I_{K''} = 40$  kA 13.8 kV :  $I_{k''} = 25$  kA

The transformer shall be capable of withstanding the resulting successive short - circuits, without cooling to normal operating temperature between successive occurrence of the short-circuit, provided the accumulated duration of short-circuit does not exceed the maximum duration permitted for single short-circuit defined above.

- (d) Transformer Tanks:  
The tank should have sufficient strength to withstand full vacuum and internal pressure of 1.05g/cm<sup>2</sup>. with cooling equipment - conservator connected. The tank cover will be clamped with bolts and nuts; and will be provided with handhole or manholes of suitable size. All seams and joint will be oil tight. Guides within the tank will be furnished to facilitate tanking and un-tanking and to prevent movement of the core and coil assembly in transit. The casing will be provided with suitable lugs for lifting the completely assembled transformer filled with oil All gaskets will be synthetic rubber bonded cork.
- (e) Radiators:  
The transformer will be provided with a number of sufficient radiators for self-cooled operation. The radiator will be installed on the tank via radiator valves, so that each radiator can be detached from the tank independently of the oil in the main tank. The radiator valves will have the open and close positions clearly marked. Radiators will be equipped with provisions for draining. Radiators shall be made of galvanized steel.

- (f) **Forced-air-cooling system:**  
 For forced-air-cooled (FA) operation, the transformer will be provided with automatically controlled three phase motor-fans actuated from winding temperature. Fan motor, weather proofed, three phase, Hz, and will thermal protected. The cooling-fans will be mounted on the radiators and the control box will be mounted on the wall of the tank. Motor Voltage: 230 VAC, 3 phase 60Hz
- (g) **On-load tap-changer:**  
 The following tap-changer will be equipped on the H.V. side having the following taps:
- |       |          |
|-------|----------|
| Tap 1 | 70,350 V |
| Tap 2 | 68,675 V |
| Tap 3 | 67,000 V |
| Tap 4 | 65,325 V |
| Tap 5 | 63,650 V |
- (h) **Oil preservation system:**  
 Conservator system with sealed diaphragm will be used. Conservator with low profile design having a moisture proof barrier made with an oil-resisting diaphragm will be applied and placed at the level slightly higher than the transformer tank.
- (i) **Painting:**  
 The standard finish will consist of one rust resisting primary coat and two finish coats of paint. The paint will be applied after the steel surface had been thoroughly cleaned by shot blasting and treated with rust inhibitor. The color of the final coat for transformer will be ANSI 70 light gray.
- (j) **Audible Sound Level:**  
 The average sound level shall be 70dB @ 33 MVA

## 6. Accessories:

- a. Off-load tap changer
- b. Dial type Oil Level indicator with contacts for alarm
- c. Oil temperature indicator - relay type AKM OTI series 34, with alarm - trip contacts.
- d. Drain valve with sampling cock
- e. Upper filter press valve
- f. Pressure relief device with trip contact (Qualitrol, self-resealing type).
- g. Hand-hole
- h. Buchholtz relay with alarm and trip contacts
- i. Lifting lug for the completely assembled unit filled with oil
- j. Lifting eye for the tank cover
- k. cooling fans, must be 3 phase, 230VAC, 60Hz, Winding temperature controlled for automatic operation, with automatic/manual change over switch with Circuit Breakers for motor overload - short circuit protection.
- l. Radiator and radiator valves.
- m. Stainless steel nameplate
- n. Two (2) Winding Temperature Indicators - Relays for HV - LV windings with three contacts each for alarm, tripping and fan control. AKM type WTi series 35.
- o. Terminal box (with fan control)
- p. Diaphragm type conservator and conservator connection valve.
- q. Grounding pads for Grounding Cables for HV Arresters, LV Arresters, - Neutral Conductor.
- r. Dehydrating breather.
- s. Steel ladder
- t. Jacking pad
- u. Anchor Bolts
- v. Skid base with pulling eye
- w. Mounting Brackets for Surge Arresters nearest to the HV - LV bushings
- x. Insulating Oil
- y. Bushing Current Transformers
  - 1. HV;  
400/300/250/200/100:5A, Class 0.3B 2.0
  - 2. LV - Neutral:  
2500/2000/1500/1000/500:5A Relaying Class C-400

## **7. Tests:**

The following tests will be carried out at our works with the presence of user representative and the records of testing will be submitted.

- a. Resistance measurements of the winding
- b. Ratio Test
- c. Polarity and phase relation test on rated voltage
- d. Measurements of No-Load Loss and Excitation Current at 90%, 100% 110% of rated voltage frequency.
- e. Load Loss, efficiency, regulation and impedance test at rated voltage
- f. Insulation oil dielectric test
- g. Applied potential test
- h. Induced potential test
- l. Impulse voltage test
- j. Temperature rise test
- k. Insulation power factor test on winding
- l. Sound level test
- m. Leak test
- n. Vacuum test on transformer tank, conservator- radiators; pressure tests on tank - oil filled compartments.
- o. Tests on auxiliary equipment - accessories - (functional tests only including cooling fans.)
- p. Voltage regulation

## **8. Protection:**

All power and control circuits must be protected by circuit breakers.

## **9. Wirings and Terminations:**

All wiring connections - terminations must be in accordance with ANSI Standards, using crimp type terminal lugs with insulator caps.

## **10. Other Accessories, Tools:**

1. Terminal Lugs
  - HV Terminals            4 Holes NEMA (Flat)
  - LV Terminals            Multi-Hole NEMA (Flat)
2. Three- Dimensional Impact Recorder with time period recording chart of at least 3-month period for use during transport of the transformer
3. Touch up paint (reserve for retouching works)
- 4 Spare Gaskets for assembly
5. Silica-gel breather

11. Pressure gauge with Nitrogen tube and automatic filling device which fill the transformer through the tube in case of any leakage shall be supplied.

