

CITY OF LODI

COUNCIL COMMUNICATION

AGENDA TITLE: Approval of Specifications and Authorization to Advertise for Bids for Polemount and Padmount Transformers for Fiscal Years 1999-2001

MEETING DATE: May 19, 1999

PREPARED BY: Electric Utility Director

RECOMMENDED ACTION: That the City Council approve the attached specifications, and authorize the Electric Utility Department and Finance Department's Purchasing Division to advertise for bids as necessary to meet the Electric Utility Department's requirements for polemount and padmount transformers through the Fiscal Year ending June 30, 2001.

BACKGROUND INFORMATION: On November 19, 1997, the City Council approved specifications for polemount and padmount transformers, and authorized staff to advertise for and receive bids for polemount and padmount transformers as needed during the fiscal years 1997-99.

This action allowed staff to advertise for bids as requirements became known, and to receive and evaluate bids without periodically seeking City Council approval to do so. Staff then brought to the Council recommendations to award based on evaluated life-cycle costs as determined from each bid received.

The City Council's 1997 authorization also provided for "fast-track" guidelines, allowing staff to award only those transformers needed for a particular "fast-track" project and, at the next regularly scheduled City Council meeting, report to the Council the award and the basis for the award. (Since the 1997 authorization, no "fast-track" awards have been necessary).

It is the recommendation of the Electric Utility Department and the Finance Department's Purchasing Division to continue this procedure through the next two fiscal years. Under this procedure, the City Council would approve specifications and authorize advertisement for bids one time, will retain the authority to award each bid as it is received and evaluated, and will have the opportunity to review any necessary "fast-track" action taken by the Department, at the next regularly scheduled Council meeting following the action.

Specifications for polemount and padmount transformers that apply to this proposal are attached.

FUNDING: Electric Utility Department's Operating Plan

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APPROVED: _____

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SPECIFICATIONS

POLEMOUNTED TRANSFORMERS - OIL FILLED

DIVISION 1 - GENERAL REQUIREMENTS

1-1 GENERAL

Electrical design and materials shall conform to the latest EEI-NEMA and ANSI Standards. It is the intent of these specifications to describe equipment of the best design and construction, for the service for which it is intended. Consequently, it shall be the City's desire to award contracts to the bidder who has demonstrated high quality by having a considerable number of transformers of bidder's manufacture in service on the lines of electrical utilities over a period of years.

1-2 TESTS

Transformers shall receive at least the following tests in accordance with the applicable ANSI and NEMA Standards:

- | | |
|---------------------------|--|
| (1) Load and no-load loss | (5) Applied and induced potential test |
| (2) Exciting current | (6) Impulse voltage test |
| (3) Polarity check | (7) Tank pressure test |
| (4) Ratio check | |

1-3 SERVICE

The manufacturer shall own and operate a service shop in this vicinity, or the bidder may submit evidence of a repair contract with an approved service shop in this vicinity, which has been in effect for a period of at least one year. (For the purpose of this specification, "vicinity" shall mean within a 200-mile radius of the City of Lodi).

1-4 GUARANTEE

The Manufacturer shall guarantee all equipment delivered under these specifications against any and all defects in material and/or workmanship for a period of at least one year from date of acceptance. Manufacturer shall rectify all such defects by repair or replacement at manufacturer's sole expense and shall assume responsibility for associated shipping costs.

1-5 TECHNICAL INFORMATION

The following specifications shall be met:

1. Insulation level: 95 kv BIL (min).
2. Insulation rating: 65 °C rise.
3. Paint: All exterior surfaces shall be painted ANSI 70 gray, using a system of coordinated and thoroughly tested materials and application techniques that will assure long life. Special attention shall be given to welds, seams, edges and rough spots.
4. Lifting Lugs: Lifting lugs shall be provided on the tank and shall be located

in such a way to avoid interference between lifting slings and any attachments on the transformer and to avoid scratching the transformer coating.

5. **Tank:** Tanks shall be tested at a pressure equal to or greater than the maximum operating pressure and for a sufficient period of time to insure that all welds are free from leaks. Tank construction shall be consistent with good manufacturing and design practices prevalent in the transformer industry, and together they should contribute to a high quality product.
6. **Nameplate:** Stainless steel or anodized aluminum nameplate shall be securely attached to the transformer by means of metal screws, rivets, or similar mechanical device(s). The letters and numbers shall be stamped or engraved on the nameplate. The nameplate shall include the words, "Fluid is less than one p.p.m. PCB," (refer to Section 1-7). The instruction nameplate shall contain the information specified in Section 5.12 of ANSI C57.12.00-1980.
7. **Sound Level:** The sound level shall be equal to or better than EEI-NEMA Standards.
8. **Size:** Size of the transformer, including radiators (fins), shall not interfere with installation or G.O. 95 requirements when banked together on cluster bracket (Dixie Electric P-538 or approved equal).
9. **Height and Weight:** Height and weight of the transformer shall be as listed below:
10. **Pressure Relief Valve:** The pressure relief valve shall be located a minimum horizontal distance of five (5) inches from the vertical centerline of the transformer hanger brackets.

Size (KVA)	Maximum Weight (lbs)	Maximum Height (inches) including bushings
15	400	45
25	500	45
37.5	625	48
50	800	51
75	1,100	51
100	1,200	51
167	1,600	51

1-6 LOSSES

Losses will be considered in the evaluation of this bid as follows:

No-load (core) loss @ \$6.00/watt

Load (winding) loss @ \$2.00/watt

The cost of losses will be added to the equipment price (bid price) F.O.B. Lodi, including maximum escalation and tax, to determine the evaluated low bid of vendor otherwise meeting these specifications. All bidders shall supply the following guaranteed loss data for use in the evaluation, in addition to other data listed in the specifications:

1. No-load losses in watts at rated secondary voltage.
2. Load losses in watts at rated secondary voltage and rated load. The standard reference temperature for load losses shall be 85 °C.
3. Upon request, furnish certification/statement of the guaranteed loss measurement error of the test equipment and measurement method to be used, including the basis for determination of the accuracy of the test equipment and measurement method.

The successful bidder shall supply a certified test report of actual losses of the unit(s) to be supplied. The no-load and load losses for each group (type and size) of transformer(s) will be averaged separately within their respective categories (no-load and load losses). If the averaged tested no-load (core) and/or load(winding) losses of the transformer group exceed the watt losses quoted in the proposal, the contract price shall be reduced by the above amounts per watt of actual group averaged no-load and/or actual load loss in excess of that quoted in the proposal. No-load loss penalties will be evaluated separately from load loss penalties. No additional payment will be made to the manufacturer or bidder for actual losses lower than the losses quoted in the proposal.

Certified test report of losses shall be submitted by the manufacturer prior to or at the time of shipment of the transformer.

1-7 PCB CONTENT

Transformer fluid shall be guaranteed to contain less than one p.p.m. by weight (mg/kg) polychlorinated biphenyls (PCB). Certified test report of PCB content shall be produced upon request. The transformer nameplate shall include the words " Fluid is less than one p.p.m. PCB."

DIVISION 2 - SINGLE PHASE

2-1 GENERAL

In addition to that specified in Division 1 - General Requirements, transformers shall be provided with the following:

1. High Voltage Bushings (Porcelain):
 - a. Quantity: Two
 - b. Bushing terminals to be clamp-type suitable for use with copper and aluminum conductor.
2. Low Voltage Bushings:
 - a. Quantity: 277-volt: Two
All others: Three
 - b. Shall be tank wall-mounted.
 - c. Bushing terminals: 100KVA and lower: Shall be clamp-type suitable for use with copper and aluminum conductor.
Over 100KVA: Shall be NEMA-4 pads (4-hole)
3. Pressure relief valve: Qualitrol 202-030-01, or an approved equal.
4. Lifting lugs shall be welded to the tank.
5. Provide tank grounding pad and a visible tank-to-cover ground strap.
6. Hanger brackets, welded to the tank.
7. Hanger brackets shall permit bolting of transformer directly to pole.
8. Single phase, 60Hz, OISC.

2-2 RATINGS AND DESIGN

Transformers shall have the following ratings and design:

1. Distribution type, pole-bolted transformer.
2. 12,000-Volt Delta primary.
3. Single phase
4. Without arresters and taps.
5. Conventional or CP type as specified on proposal form. CP transformers to have one weak link (fuse) per primary bushing and a breaker on the secondary side.
6. Secondary voltage to be as specified on the proposal form.
7. KVA rating to be as specified on the proposal form.

4.000 GENERAL REQUIREMENTS

Electrical design and materials shall conform to the latest EEI-NEMA and ANSI Standards for Oil-Filled Equipment. It is the intent of these specifications to describe equipment of the best design and construction, for the service for which it is intended. Consequently, it shall be the City's desire to award contracts to the bidder who has demonstrated high quality by having a considerable number of transformers of his manufacture in service on the lines of electrical utilities over a period of years.

4.001 TESTS

Transformers shall receive at least the following tests in accordance with the applicable ANSI and NEMA Standards:

- | | |
|--------------------------|---------------------------------------|
| 1. Load and no-load loss | 5. Applied and induced potential test |
| 2. Exciting current | 6. Impulse voltage test |
| 3. Polarity Check | 7. Tank pressure test |
| 4. Ratio check | |

4.002 SERVICE

The manufacturer shall own and operate a service shop in this vicinity, or the bidder may submit evidence of a repair contract with an approved service shop in this vicinity, which has been in effect for a period of at least one year. (For the purpose of this specification, "vicinity" shall mean within a 200-mile radius of the City of Lodi).

4.003 GUARANTEE

The Manufacturer shall guarantee all equipment delivered under these specifications against any and all defects in material and/or workmanship for a period of at least one year from date of acceptance. Manufacturer shall rectify all such defects by repair or replacement at manufacturer's sole expense and shall assume responsibility for associated shipping costs.

4.004 TECHNICAL INFORMATION

1. **Insulation level:** 95 kv BIL (min).
2. **Insulation rating:** 65 ° C rise.
3. **Ground Lugs:** Two (2) ground lugs which accept a range of #4 to 1/0 AWG copper shall be provided.
4. **Paint:** All exterior surfaces shall be painted Munsell 7GY3.29/1.5 (olive) green (or approved equal), using a system of coordinated and thoroughly tested materials and application techniques that will assure long life. Special attention shall be given to welds, seams, edges and rough spots.
5. **Lifting Lugs:** Lifting lugs shall be provided on the tank and shall be located in such a way to avoid interference between lifting slings and any attachments on the transformer and to avoid scratching the transformer coating.
6. **Tanks:** Tanks shall be tested at a pressure equal to or greater than the maximum operating

pressure and for a sufficient period of time to insure that all welds are free from leaks. Tank and radiator construction shall be consistent with good manufacturing and design practices prevalent in the transformer industry, and together they should contribute to a high quality product.

7. **Nameplates:** Stainless steel or anodized aluminum nameplate shall be securely attached to the transformer by means of metal screws, rivets or similar mechanical device(s). The letters and numbers shall be stamped or engraved on the nameplate. The nameplate shall include the words, "Fluid is less than one p.p.m. PCB, when manufactured", refer to Section 4.006. The instruction nameplate shall contain the information specified in Section 5.12.2 of ANSI Standard C57.12.00-1993.
8. **Sound level:** The sound level shall be equal to or better than EEI-NEMA Standards.

4.005 LOSSES

1. **No-load (core):** loss @ \$6.00/watt
2. **Load (winding):** loss @ \$2.00/watt
3. **Evaluation:** The cost of losses will be added to the equipment price (bid price) F.O.B. Lodi, including maximum escalation and tax, to determine the evaluated low bid of vendor otherwise meeting these specifications.
4. **Guaranteed Loss Data:** Bidders shall supply the following guaranteed loss data for use in the evaluation, in addition to other data listed in the specifications:
 - A. No-load losses in watts at rated secondary voltage.
 - B. Load losses in watts at rated secondary voltage and rated load. The standard reference temperature for load loss shall be 85°C.
 - C. Upon request, furnish certification/statement of the guaranteed loss measurement error of the test equipment and measurement method to be used, including the basis for determination of the accuracy of the test equipment and measurement method.
5. **Certified Test Report:** The successful bidder shall supply a certified test report of actual losses of the unit(s) to be supplied. The no-load and load losses for each group (type and size) of transformer(s) will be averaged separately within their respective categories (no-load and load losses). If the averaged tested no-load (core) and/or load(winding) losses of the transformer group exceed the watt losses quoted in the proposal, the contract price shall be reduced by the above amounts per watt of actual group averaged no-load and/or actual load loss in excess of that quoted in the proposal. No-load loss penalties will be evaluated separately from load loss penalties. No additional payment will be made to the manufacturer or bidder for actual losses lower than the losses quoted in the proposal.
6. **Certified Test Report of Losses:** The manufacturer shall submit certified test report of losses prior to or at the time of shipment of the transformer.

4.006 PCB CONTENT

Transformer fluid shall be guaranteed to contain less than one p.p.m. by weight (mg/kg) polychlorinated biphenyls (PCB). Certified test report of PCB content shall be produced upon request. The transformer nameplate shall include the words, "Fluid is less than one p.p.m. PCB when manufactured".

4.007 DIMENSIONS

The overall dimensions of the units (height, width, depth - height only for single-phase units) will be considered in the evaluation of this bid.

4.008 LABELING

The units are to be shipped without the Safety Labels per NEMA No. 260-1991. The City will affix its personalized "Mr. Ouch" labels.

4.009 PADMOUNTED EQUIPMENT ENCLOSURES

A typical padmounted equipment enclosure consists of a surrounding case or housing for equipment to prevent unauthorized access to protect people against accidental contact of energized parts and protect equipment against weather hazards. The enclosure is mounted on a pad, above ground level, and may be ventilated to permit circulation of air.

Entry into the enclosure shall be through either access door(s) or hood(s) as specified.

1. **Structural Strength and Integrity Test:** The structural strength and integrity test shall comply with the latest NEMA and ANSI Standards for testing, design and enclosure security.
2. **Construction** shall be such that:
 - A. It prevents the entry of foreign objects, such as sticks, rods or wires.
 - B. It inhibits dismantling of the equipment.
 - C. It is free of areas which could provide access by forcing techniques.
 - D. Panels shall be fastened or hinged to resist disassembly, breakings or prying open from the outside. Normal entry shall be possible only with the use of proper access tools. Latches and other provisions for locking hinged panels shall be furnished.
 - E. There shall be no exposed screws, bolts or other fastening or hinging devices which are externally removable (with the exception of pentahead bolts provided for extra security) that would provide access to energized parts of the enclosure.
 - F. The transformer tank and enclosure shall be constructed of minimum 14 gauge steel. The radiator to be constructed of minimum 18 gauge steel.
 - G. In addition to the regular locking provisions, all access doors shall be secured by a recessed, captive, pentahead bolt which threads into a nut with a bind hole. A pentahead bolt will be considered "captive" when the retention scheme will prevent it from being

readily removed during normal operation of the door(s) or the hood(s). The recess is to be nonrotating. The dimensions of the pentahead bolt and nonrotating recess shall comply with Figure 1 of ANSI C57.12.28-1988. If all doors can be secured with a single bolt, one bolt will be sufficient.

- H. Each latched door(s) shall be latched at a minimum of three points. In addition to the three-point latching, one pentahead bolt shall be coordinated with the latch and padlock to prevent unlatching and insertion of the padlock into the hasp when and until the bolt head is completely seated. Low profile cabinets, with access flip-up hoods, need only padlock and pentahead bolt provisions, and shall be coordinated to prevent insertion of the padlock into the hasp until the bolt head is completely seated.
- I. The padlocking device shall be so designed and located as to resist prying or breaking off by screwdrivers, wrecking bars, tire irons, single-socket lug wrenches, or other readily accessible tools.
- J. The edges of the access doors or hoods shall be formed to provide:
 - 1) A close-fitting mating surface, with internal insertion- prevention lip that will be shaped to prohibit entry or prying by screwdrivers, wrecking bars, tire irons, single-socket lug wrenches, or other readily accessible tools.
 - 2) Rigid panel which, in conjunction with a handle-linkage-latching mechanism with three (or more) point latching, will resist bending in the event that sufficient force is applied to distort the compartment or compartment door(s) and permit prying access to the door edges.
- K. Hinge pins shall be passivated AISI (American Institute of Steel Industries) Type 304 stainless steel, or approved equal.
- L. If a handhole cover is exposed, it shall be secured against tampering by some means accessible only from the inside of the compartment.
- M. The bottom edge of the enclosure shall provide for flush mounting on a flat, rigid, mounting surface to prevent wire entry into the compartment.

4.010 SINGLE PHASE UNITS

Transformer enclosures to be in conformance with Section 4.009 of this specification and be of the low-profile design, maximum height for 75 KVA and below shall be 28", and for 100 KVA and above shall be 33". The access door shall open to the top 180° and be removable. The design shall be dead front, loop feed. Cables shall enter and leave the transformer from below through openings in a pad. The front plate of the transformer tank shall be constructed (reinforced) in such a manner that tank pressure does not cause any reduction in clearances between the energized parts and grounded surfaces, i.e. deflection resulting in spades and bushings moving toward the sides of the door.

The Bay-O-Net fuse shall be positioned in such a way that the fuse assembly can be inserted and locked in any position without interfering with the closed door. Fastening of the oil drip plate and/or the fuse insertion restrictive device with a "U" clamp around the molded outer tube assembly is not acceptable.

1. **Bushing Heights:** Primary and secondary bushing heights shall comply with the latest revisions

of NEMA TR1 and ANSI C57.12.25-1990 Standards, Type 2 Arrangement Figure 2(b).

2. **Standard Accessories:** In addition to that specified in Section 4.000-4.009, transformers shall be provided with the following:
 - A. Pressure relief valve, Qualitrol 202-030-01, or approved equal.
 - B. Low voltage terminal, 4-hole in-line spade type, per ANSI C57.12.25, (all insulated), which may be rotated to allow convenient connection of cables.
 - C. Oil filler and drain plugs.
 - D. Two (2) parking stands for high-voltage terminations, ANSI C 57.12.20, Figure 2b or two separate parking stands (reference Figure 2a) and positioned on the "C/L Cable Accessory Parking Stand".
 - E. Two (2) loop feed, high-voltage universal bushing wells.
 - F. Bay-O-Net fuse assembly with molded outer tube, "Flapper" valve, Cooper Power Systems catalog number 4000361C99FV, isolation link, or approved equal; and oil drip plate below fuse holder entrance. Fuse element not to be installed, but supplied in a bag attached to fuse holder handle. If the manufacturer desires to install the fuse an additional fuse of the size and type specified shall be supplied in a bag attached to fuse holder handle.

3. **Ratings and Designs:**
 - A. Dead front, loop feed with two (2) universal busing wells.
 - B. Voltage: 12,000 Grd.Wye/6,930 volts primary to 240/120 volt secondary.
 - C. Single phase, 60Hz, OISC.
 - D. Transformers shall be provided with RTE dual sensing Bay-O-Net #4000358C or approved equal fuse links in accordance with Table A.
 - E. KVA rating to be as specified on proposal form.

4. Fuse Links:

Table A
Fuse Links (Single Phase)

Transformer KVA	Designation Dual Sensing 4000358()	Link Rating (Amp)	Isolation Link 3001861A ()
10	C 05	8	02M
15	C 05	8	02M
25	C 05	8	02M
37.5	C 08	15	03M
50	C 08	15	03M
75	C 10	25	05M
100	C 10	25	05M
167	C 12	50	06M

4.011 THREE PHASE UNITS

Transformer enclosure to be in conformance with Section 4.009 of this specification. Maximum transformer height shall not exceed values listed in Table B below. High and low voltage compartments shall be separated, the low voltage door shall be equipped with a locking handle, and in addition, the doors so arranged that access to the high-voltage compartment can be gained only after opening the low-voltage door; doors shall be removable. Cables shall enter and leave the compartment sections from below, through openings in a concrete pad.

Fastening of the oil drip plate and/or the fuse insertion restrictive device with a "U" clamp around the molded outer tube assembly is not acceptable.

TABLE B
TRANSFORMER HEIGHT

TRANSFORMER KVA	MAXIMUM HEIGHT
300 KVA and below	65"
500 KVA	75"
750 KVA and above	90"

1. **Bushing Location and Heights:** Primary and secondary bushing locations and heights shall comply with the latest revisions of NEMA TR1 and ANSI C57-12.26-1993 Standards for Type A primary and staggered low-voltage terminal arrangement.
2. **Standard Accessories:** In addition to that specified in Section 4.000-4.009, transformers shall be provided with the following:
 - A. Pressure relief valve: Qualitrol 202-030-01, or approved equal.
 - B. Four (4) low voltage bushing spades (4 hole for 500 KVA and below, 6-hole for 750 KVA and above, per ANSI C57.12.26).
 - C. Liquid level gauge, drain valve with sample valve and oil filler plug. Drain valve to be located in the high-voltage compartment.
 - D. Parking stands for each high-voltage elbow terminator.
 - E. Universal bushing wells, for high-voltage terminations.
 - F. Bay-O-Net fuse assembly with molded outer tube, "Flapper" valve, Cooper Power Systems catalog number 4000361C99FV, isolation link or approved equal; and oil drip plate below fuse holder entrance. Fuse elements not to be installed, but to be supplied in a bag attached to a fuse holder handle. If the manufacturer desires to install the fuses, additional fuses (3) of the size and type specified shall be supplied in a bag attached to a fuse holder handle.
3. **Ratings and Design:**
 - A. Dead front, radial feed design with three (3) universal bushing wells.
 - B. 12,000 volt Delta connected primary.
 - C. Three phase, 60 Hz, OISC.
 - D. 500 KVA and larger units only:
 - 1) On-Off loadbreak, gang-operated, oil-immersed switch.
 - 2) Switch handle with eye for operation with hot stick shall be located in high-voltage compartment.
 - E. Transformers shall be provided with RTE dual sensing Bay-O-Net #4000358C or current sensing #4000353C or approved equal fuse links in accordance with Table C.
 - F. Secondary voltage rating to be as specified on proposal form.
 - G. KVA ratings to be as specified on proposal form.

4. Fuse Links:

TABLE C
Fuse Links / Three Phase

Transformer KVA	Designation Dual Sensing 4000358 ()	Link Rating (Amp)	Isolation Link 3001861A ()
75	C 05	8	02M
112.5	C 08	15	03M
150	C 08	15	03M
225	C 10	25	05M
300	C 10	25	05M
500	C 12	50	06M

	Current Sensing 4000353 ()		
750	C14	65	05M
1000	C16	100	05M
1500	C17	140	05M

End Section 4