

1. Scope

This Material Standard covers the requirements for furnishing and delivering pole-mounted, three-phase, fixed, shunt capacitor banks suitable for use on a 12,470 volt, four-wire, grounded WYE primary distribution system.

2. Material ID Numbers

This Material Standard applies to District Material ID's for the following three-phase pole-mounted capacitor banks:

646078 300 kVAR [1-100 kVAR capacitor per phase]
646086 450 kVAR [1-150 kVAR capacitor per phase]
646119 600 kVAR [2-100 kVAR or 1-200 kVAR capacitor(s) per phase]
646060 900 kVAR [2-150 kVAR or 1-300 kVAR capacitor(s) per phase]
1001677 1200 kVAR [2-200 kVAR capacitors per phase]
646143 1350 kVAR [3-150 kVAR capacitors per phase]

3. Reference Standards

The capacitors supplied under this Specification shall conform to the characteristics, definitions, terminology, and requirements of the latest editions, amendments, and supplements of:

ANSI/IEEE 18-2002 IEEE Standard for Shunt Power Capacitors
ANSI/IEEE 1036-1992 IEEE Guide for the Application of Shunt Power Capacitors
ANSI C2 National Electrical Safety Code

4. Electrical Ratings

Power Frequency 60Hz
Rated Voltage 7.2kV, RMS (terminal to ground)
BIL 95kV
Reactive Power kVAR as indicated above in section 2

5. Construction

5.1 Tank

5.1.1 The tank shall be of welded steel construction free from leaks and seepage.

5.1.2 The surface shall be properly cleaned and painted for protection against severe atmospheric conditions, oxygen, acid salts and alkalis.

5.1.3 The tank finish shall be ANSI Z55.1, light gray No. 70, Munsell 5.OBG 7.0/0.4.

5.1.4 All external fittings and cover bolts, washers and nuts shall be stainless steel. Clamping devices shall be of corrosion resistant material.

5.1.5 The tank mounting bracket shall not have braces extending over the top of the tank. The pole mounting bracket surfaces shall be processed in accordance with 5.1.1.

5.1.6 The capacitor unit shall be of the all-film dielectric type. A copy of the dielectric fluid's MSDS shall be provided for District review whenever the District requests a quote for capacitors. The dielectric fluid to be used must be approved by the District's Environmental Affairs before the capacitors can be supplied. The dielectric fluid shall not contain halogenated organic compounds including polychlorinated biphenyls (PCBs). Preference will be given to dielectric fluids that are non-hazardous.

5.2 Non-PCB Labels

5.2.1 A NON-PCB label shall be affixed to one end of the lower half of each capacitor tank. The label shall indicate that the capacitor dielectric fluid contained less than 1 PPM PCB at the time of manufacture.

5.2.2 The label shall have a UV-resistant blue opaque background, Pantone Color 293 C, with white reflective reversed out copy. The label shall conform to the latest revision of District Material Standard No. 1000212.1 or shall be a District-approved equal label.

5.3 Bushings

5.3.1 Each capacitor shall have two bushings.

5.3.2 The creepage distance of each bushing shall be 11-inches minimum.

5.3.3 Each bushing shall be rated at 95kV BIL or greater.

5.3.4 Each bushing shall be made of glazed, wet-processed porcelain, or District approved equal. The District will be the sole judge of whether non-porcelain bushings are acceptable.

5.3.5 Each bushing terminal shall be of the clamp connector type and shall accommodate copper conductors in sizes #8 solid - #2 stranded AWG.

5.4 Nameplate

The nameplate shall be attached to the outside of the capacitor bank and shall include, as a minimum, the manufacturer's name, serial number, nominal voltage (kV), BIL (kV), kVAR, weight and date of manufacture.

5.5 Rack/Hanger

5.5.1 The racks shall be pole-mounted type.

5.5.2 The rack shall be able to receive the designated number of capacitor tanks.

5.5.3 Four eyes shall be provided on each rack for lifting purposes. The bearing surfaces of the lifting eyes shall be free from sharp edges and shall all lie in the same horizontal plane.

5.5.4 A minimum of one ground lug shall be furnished on each rack for positive electrical grounding.

5.5.5 Each rack shall be completely factory assembled. Each rack shall be fabricated of aluminum. Corrosion protection shall be applied between the aluminum and dissimilar metals to avoid galvanic action.

5.6 Alignment

The capacitor units shall be assembled vertically-mounted with the primary bushings situated on the side opposite from the pole mounting bracket.

5.7 Wiring

All wiring shall be bird-proof and the color shall conform to ANSI Z55.1, light gray No. 70, (Munsell 5.OBG7.0/ 0.4). The bird-proof material shall be resistant to ultraviolet degradation.

6. Certified Test Reports

6.1 All Bidders shall provide certified test reports verifying that the equipment meets or exceeds the electrical ratings, tamper resistance and finish required by this specification.

6.2 All Bidders shall furnish one certified copy of the test report for Capacitor Unit Power Loss (initial and after 4,000 hours of operation, @ 0°C) and Voltage Stress (volts per mil) at rated voltage on film portions of the dielectric.

6.3 The Supplier, shall furnish one certified copy of the test reports for each capacitor bank. These tests shall be a minimum of the routine tests described in ANSI/IEEE 18, latest revision.

6.4 The above reports shall be mailed to:

PUD No. 1 of Snohomish County
Attention: System Planning & Protection O1
PO Box 1107
Everett, WA 98206-1107

7. Bidders' Data

In addition to the information required on the attached Exhibit A, Bidder's Data Sheet, Bidder's shall provide:

7.1 A list of all proposed changes, additions or exceptions to this specification along with adequate explanations for each departure from the specification

7.2 Drawings showing proposed capacitor tank design and overall weights and dimensions

7.3 One instruction manual covering installation, operation and maintenance of the capacitor bank

7.4 Completed Material Safety Data Sheet for the dielectric fluid being used in the capacitors

8. Warranty

8.1 The Supplier shall guarantee all parts of the capacitor bank against defects in material and workmanship for a minimum of 12-months from the date of energization or 18-months from the shipping date, whichever comes first.

8.2 Upon written notice from the District, the Supplier shall immediately repair or replace, at his own expense, all or any part of the capacitor bank that may prove to be defective during the period of this guarantee, whether installed initially or installed as repair or replacement under this guarantee.

8.3 The Supplier further guarantees that the warranty for repaired or replaced material shall be of an equal duration as the original warranty period and shall start upon acceptance of such repaired or replaced material.

9. Shipment

9.1 Shipment shall be:

FOB PUD No. 1 of Snohomish County
Operations Center Receiving
1802 75th Street SW
Everett, WA 98203-6264

9.2 Equipment damaged in shipment will be refused on delivery and it will be the Supplier's responsibility to arrange the prompt repair or replacement to the standards of new equipment. The Supplier will not be relieved of the responsibility of delivering undamaged equipment, even if the damage is internal, or otherwise goes undetected and the nature of the damage remains unknown until the equipment is energized and tested.

9.3 Each capacitor bank shall be completely assembled and packaged in accordance with good commercial practice to ensure safe delivery without damage.

9.4 Provisions shall be made to protect capacitor banks shipped on flatbed trucks from contamination, rocks, dirt, insects and other foreign materials encountered in shipment.

9.5 Each capacitor bank shall be shipped on a nonreturnable wood pallet designed for handling with a forklift. Pallets shall have a minimum of 3-1/2 inches of vertical clearance for forks. Pallets shall be of adequate strength to withstand normal shipping and handling.

9.6 Capacitor banks shall be shipped so that they may be removed from the truck or trailer by forklift.

9.7 No material or other equipment shall be stacked or carried on top of the capacitor bank.

10. Evaluation of Bids

The following factors will be considered in the analysis and evaluation of bids and subsequent bid award:

10.1 Price

10.2 Past performance of Bidder and product

10.3 Construction and Operation details

10.4 Adherence to requirements

10.5 Manufacturing ability

10.6 Delivery schedule

11. Inspection

After delivery, inspection shall be in accordance with Section 2 of the District's Purchase Order Terms and Conditions, latest revision. If returning rejected equipment to the supplier, the shipping costs will be at the supplier's expense.

12. Correction of Deficiencies and Nonconformities

Any opportunity for the Supplier to correct deficiencies and nonconformities will be at the sole discretion of the District and at the sole expense of the Supplier. If the District elects to allow corrections, mutual arrangements shall be made for their completion. Any subsequent testing required due to deficiencies and nonconformities will be at Supplier's expense.

All shipping costs associated with correction of deficiencies and nonconformities will be at Supplier's expense.

13. General Bidding Conditions

The attached General Bidding Conditions are made a part of this Material Standard.

**EXHIBIT A
BIDDER'S DATA SHEET**

MANUFACTURER'S NAME	_____		
KVAR RATING OF BANK	_____		
ITEM	DESCRIPTION	GUARANTEED AVERAGE VALUES	
1.	Initial Losses (@ 0 °C)	_____	watts
2.	Losses after 4,000 hrs (@ 0 °C)	_____	watts
3.	Internal Hot Spot Temperature	_____	°F
4.	Voltage Stress on Film	_____	volts/mil
5.	Net Weight	_____	lbs
6.	Quantity of Dielectric Capacitor Fluid	_____ gallons	_____ lbs
7.	Limiting Overall Dimensions	width	_____ inches
		depth	_____ inches
		height	_____ inches
8.	Type of Tank Material	_____	
9.	Type of Finish	_____	