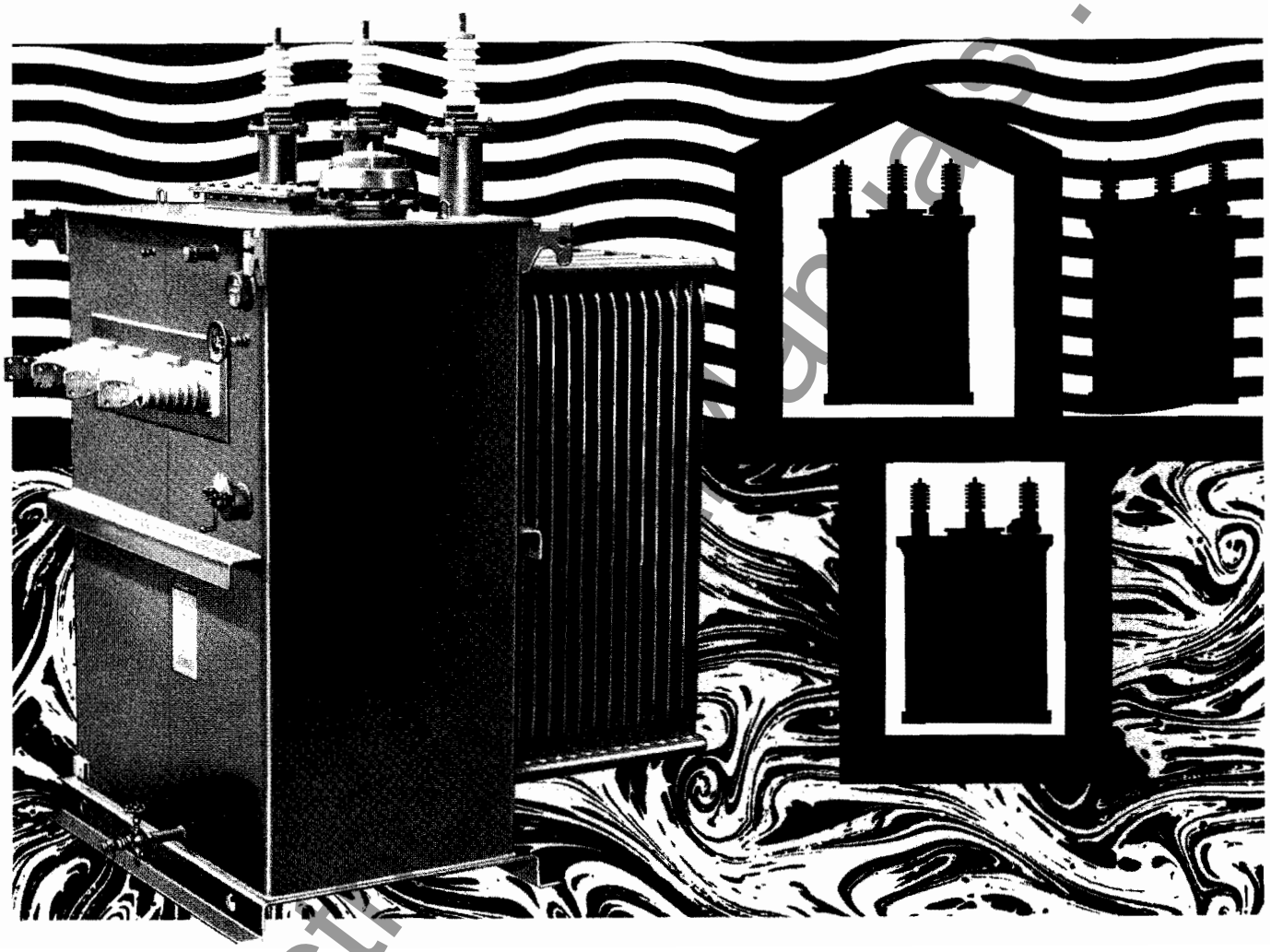
Westinghouse

Distribution Substation Transformer



Application

The Westinghouse Distribution Substation transformer is specifically designed to service commercial buildings and industrials where ease of installation, first cost savings and economical operation are prime considerations.

Ratings are from 750 Kva through 5000 Kva. Transformers are designed in accordance with NEMA Standard TR-11.

Due to their smaller size and lighter weight, these units can be installed outdoor, indoor or in vaults.

Standard Electrical Characteristics

Phase: Three phase construction

Frequency: 60 Hertz

Kva Ratings: 750, 1000, 1500, 2000, 2500, 3750, 5000

Impedance:

HV Rating	LV-480 V and Below	LV-2400 V and Above
2400-24940	5.75	5.5
26400-34400	6.25	6.0

Standard Paint Finish

Standard paint finish is ANSI No. 61 (light grey – indoor) or ANSI No. 70 (light grey – outdoor) or ANSI No. 24 (dark grey – outdoor).

The Westinghouse standard finish is a three-coat system applied as follows:

A. Tank metal prior to forming is shot blasted and coated with a rust inhibitor to form a completely clean and protected surface during shop handling.

B. The completed tank is given a wash and phosphatized coating to inhibit corrosion and gives a base for high mechanical strength of paint bonding.

C. An epoxy primer coat cured in a baking oven at 150°C.

D. Westinghouse top coat, composed of an alkyd-amine (Melamine) paint containing special pigments selected to give long outdoor service in varying climatic exposures and maintain attractive appearance, are applied and given a baked finish at 150°C. The third coat is an alkyd air dry touch-up coat.

Prices effective November 14, 1972; subject to change without notice. For standard terms and conditions of sale, refer to Selling Policy 48-000.

December 5, 1972
New Information
E. D. C/2092/DB, PL

Westinghouse

Conditions of Sale

Standard Conditions of Sale – The product covered by this catalog is sold subject to the discount schedules, policies, terms, warranties and other conditions contained in the latest issue of Selling Policy 48-000.

Special Conditions of Sale – Refer to Selling Policy 48-000 for the price additions for F.O.B. destination, delayed payments, special warranty and extended warranty.

Exchange Allowance – An exchange allowance for old transformers in connection with the purchase of new transformers is not permitted.

Electrical Tests

Electrical tests are performed as standard in accordance with ANSI Standard Test Code for transformers.

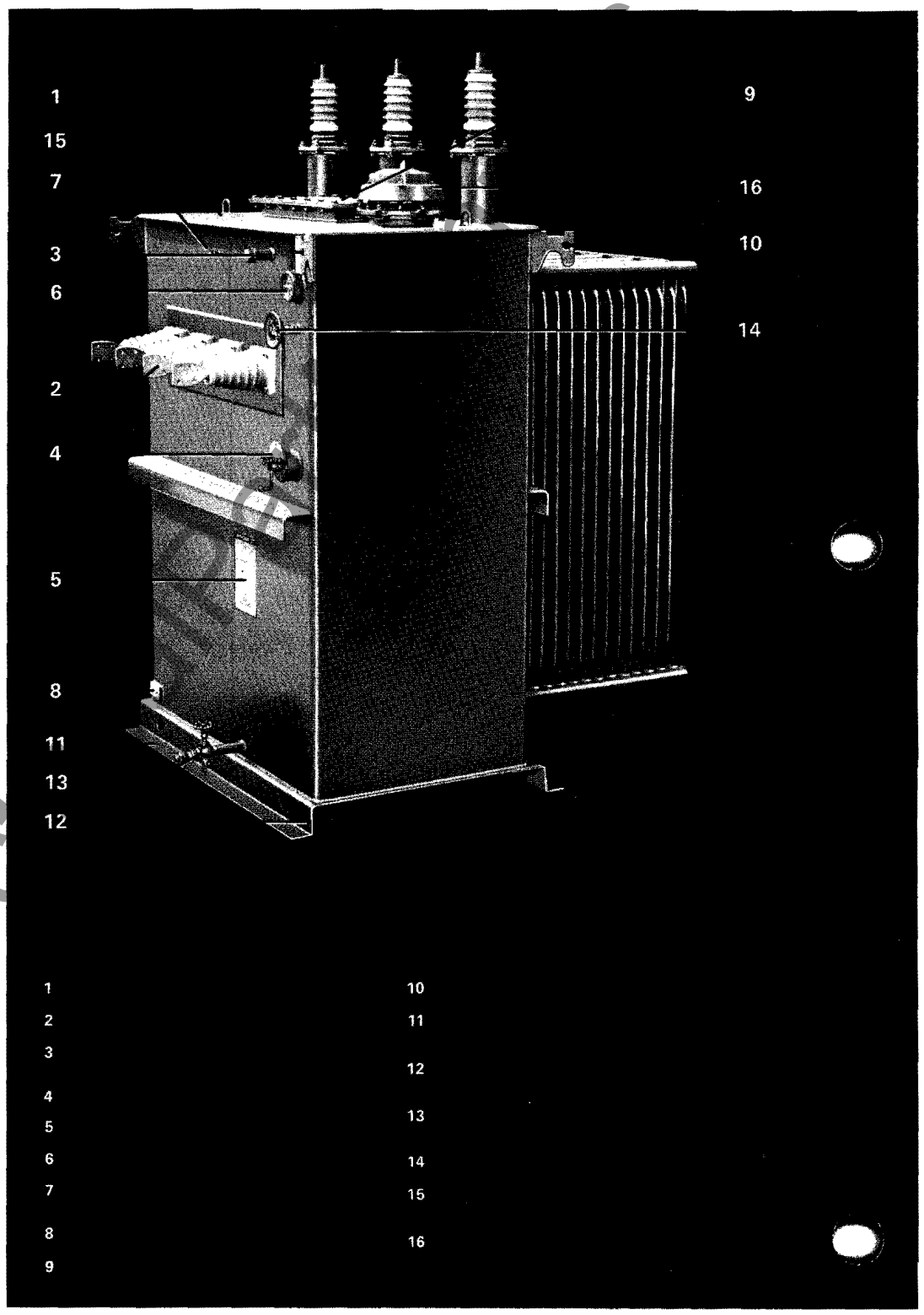
1. Resistance measurements.
2. Ratio tests.
3. Polarity and phase relation.
4. No load loss.
5. Exciting current.
6. Impedance and load loss.
7. Applied potential test.
8. Induced potential test.
9. Temperature test or tests will be made on one unit only of an order covering one or more units of a given rating. Tests will be made only when there is not available a record of a temperature test, made in accordance with ANSI Standards, on a duplicate or essentially duplicate unit.

High Voltages

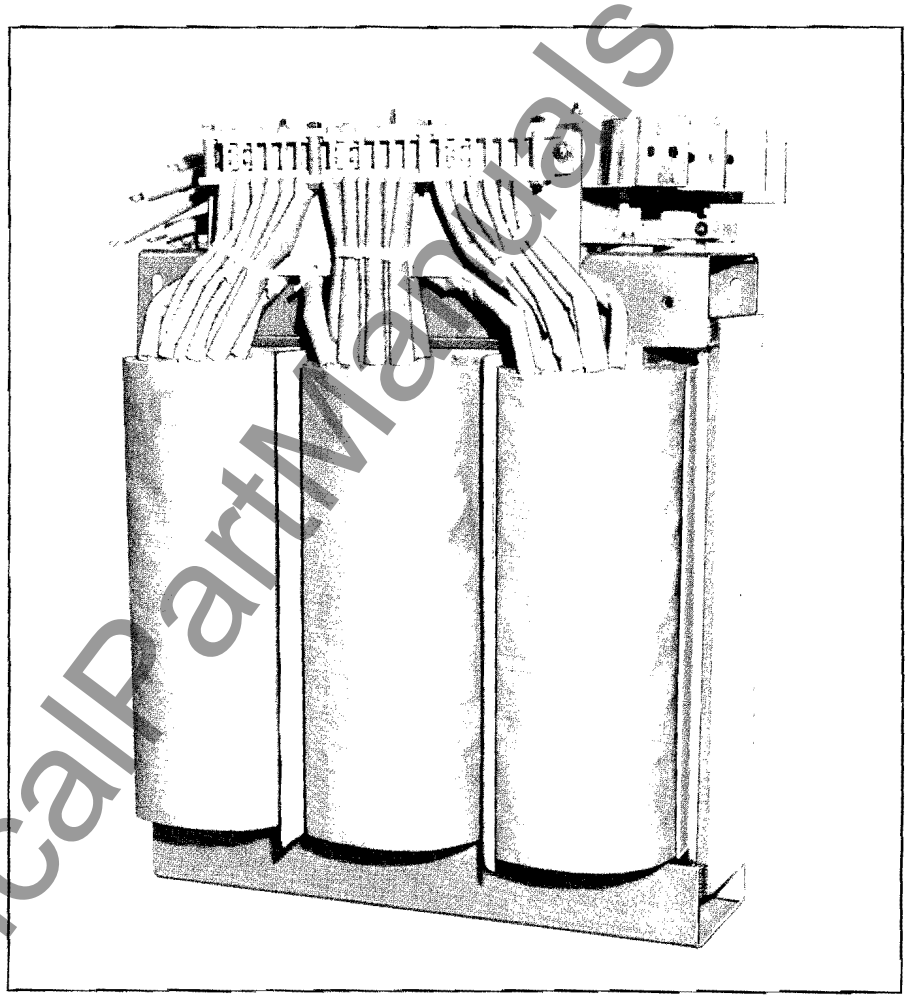
High Voltage	Insulation Class	Standard BIL KV
2400	2.5	45
4160	5.0	60
4800	5.0	60
6900	8.7	75
7200	8.7	75
12000	15.0	95
12470	15.0	95
13200	15.0	95
13800	15.0	95
22900	25.0	125
24940	25.0	125
26400	34.5	150
34400	34.5	150

Low Voltages

Low Voltage	Insulation Class KV	Standard BIL KV
208Y/120	1.2	30
240△	1.2	30
480Y/277	1.2	30
480△	1.2	30
2400▲	2.5	45
2400Y	2.5	45
2520▲	2.5	45
4160Y	5.0	60
4360Y	5.0	60
4800▲	5.0	60



Distribution Substation Transformer



Rectangular Core and Coils WSS Tap Changer

The Westinghouse externally operated WSS tap changer provides positive sequence line voltage changes under no-load conditions. An in-line assembly, the WSS features through-type stationary contact studs rigidly supported by a molded plastic channel. Moving contacts are spring loaded, silver plated copper which move along the stationary line by means of a rack and pinion.

This design has no rivets, bolts or nuts, thus assures the proper contact of current carrying parts when taps are changed. With **no** reported outages, the WSS benefits the user through a reduction of repair or replacement costs by eliminating faulty tap changer operation, the cause of failure in 20% of all power transformers.

Rectangular Aluminum Wound Coils

The Westinghouse rectangular wound coil features aluminum conductor in both high and low voltage windings. The low voltage winding is accomplished on a constant tension machine and consists of full width sheet aluminum extending the full height of the coil. High voltage strap aluminum is wound directly over the low voltage winding on a constant tension traversing machine. Layer to layer and high to low insulation is diamond epoxy paper which when heat treated bonds the complete coil into a solid configuration.

The advantage of low voltage sheet aluminum is a continuous cross section of conductor that allows the electrical centers of high and low voltage windings to easily align themselves, virtually eliminating the vertical component of short circuit force.

The benefit is a coil so uniform and compact, the chance of windings overlapping during short circuit is minimized, reducing failure rate, repair and/or replacement cost.

Welded Frame

The Westinghouse exclusive welded frame provides a superior six piece supporting structure for the core and coils. End plates are thick steel slabs that are assembled in a mechanical and pressure jig around the core and coils, then welded to top and bottom plates to form a rigid structure that will not loosen during assembly, shipment, or in service. To determine the thickness of members used (even the thickness of welds), a short circuit calculation is made for each unit to determine the forces of short circuit.

The result is an assembly that restrains more effectively vertical and horizontal components of force, decreasing the probability of failure during severe short circuits.

This benefits the user by a reduction in repair or replacement costs and a reduction in downtime that means loss of service or lost production.

Step-Lap Core

The Westinghouse exclusive stacked core provides a superior flux path by utilizing the patented step-lap joining of core legs to top and bottom yokes. Hand stacked Hypersil steel punchings with interlocking laminations can be more uniformly and rigidly braced to prevent shifting during service.

The user can benefit through reduced sound levels, lowered iron and total losses, and decreased exciting current to lower total operating cost.

On wye-wye units a fourth leg is added to provide a path for circulating third harmonic flux during unbalance condition.

Super Insuldur Insulation

The Westinghouse Super Insuldur Insulation effectively upgrades cellulose insulating materials thermally for increased load and overload capability. Retarding insulation breakdown under severe temperature conditions, the chemical stabilizers in the insuldur process minimize dimensional changes in the insulating materials insuring a tighter structure, contributing to greater strength and coil integrity throughout the life of the transformer.

The user benefit is a coil that better withstands short circuit and allows an operation at 10°C higher temperature on a 55°C rated unit with a 12% increase in KVA capacity.

Distribution Substation Transformer

Standard arrangement includes cover-mounted high voltage bushings to receive supply lines from overhead. Low voltage bushings are side wall mounted to facilitate low voltage cables. Other arrangements are available which permit application flexibility.

Sound Levels

Kva	Sound Level
750	58 db
1000	58 db
1500	60 db
2000	61 db
2500	62 db

Negotiation Data and Ordering Information

When corresponding on negotiations or entering orders, the following minimum information, a copy of purchaser's specifications and other information that could influence requirements, must be included.

1. Number of Units
2. Kva Rating
3. Cooling (Oil or Inerteen)
4. High Voltage, Connection (Delta or Wye) and taps
5. Low Voltage (Delta or Wye)
6. High Voltage Termination
7. Low Voltage Termination

Pricing

Prices determined from these pricing instructions may be used for estimating purposes. All final prices must be obtained from the Small Power Transformer Division.

Pricing Procedure

1. Select the base list price from the table according to low voltage and Kva.
2. Select the percentage additions that apply. The sum of the percentage additions times the base list price added to the base list price gives the developed price.
3. Select the dollar additions that apply and add the sum to the developed price to get the total list price.
4. Select the percentage additions from Selling Policy 48-000 that apply. The sum of these percentages times the total list price added to the total list price gives the final list price.
5. If export packing is required, make the addition to the final list price.
6. Determine the user discount multiplier from the latest issue of Selling Policy 48-000. This multiplier times the final list price gives the final net price.

Optional Accessories

Percentage Additions

55°/65°C Rise, add **5%**
Y-Y Connection (4-legged core), add . **5%**

High Voltage Ratings (Delta-Connected) 2400, 4160, 4360, 4800, 6900, 7200, 12000, 12470, 13200, 13800, 14400

65°C Kva	Low Voltage 208Y/120	240	480 480Y/277	2400, 2400Y/1385, 2520 4160Y/2400, 4360Y/2520, 4800
750	**$6784**	**$6542**	**$ 5980**	**$ 6058**
1000	**8154**	**7867**	**6892**	**6502**
1500	....	....	**9172**	**8493**
2000	....	....	**11532**	**10484**
2500	....	....	**13191**	**11779**
3750	....	....	.....	**15016**
5000	....	....	.....	**18254**

High Voltage Ratings (Delta-Connected) 22900-24940

65°C Kva	Low Voltage 208Y/120	240	480 480Y/277	2400, 2400Y/1385, 2520 4160Y/2400, 4360Y/2520, 4800
750	**$8390**	**$8090**	**$ 7791**	**$ 7492**
1000	**9856**	**9510**	**9164**	**7897**
1500	....	....	**11830**	**9959**
2000	....	....	**14588**	**12056**
2500	....	....	**16407**	**13317**
3750	....	....	.....	**16469**
5000	....	....	.....	**19620**

High Voltage Ratings (Delta-Connected) 26400, 34400

65°C Kva	Low Voltage 208Y/120	240	480 480Y/277	2400, 2400Y/1385, 2520 4160Y/2400, 4360Y/2520, 4800
750	**$ 8730**	**$8418**	**$ 8107**	**$ 7795**
1000	**10274**	**9913**	**9553**	**8192**
1500	....	....	**12363**	**10406**
2000	....	....	**15270**	**12620**
2500	....	....	**17129**	**13903**
3750	....	....	.....	**17112**
5000	....	....	.....	**20322**

Inerteen® (15 Kv and Below only), add **25%**
15 P.S.I. Tank, add **3%**
Series Multiple Winding
No. of Multiples:
2, add **5%**
3, add **8%**
Taps will only be available on the series connection of the high voltage winding. Terminal board or external switch may be specified at customer option.

Percentage Deductions

Taps, omission of, deduct **2%**

Dollar Additions

Delta-Wye Terminal Board, add . . . . **$ 395**
Sudden Pressure Relay, add . . . . . **$ 390**
Dial Hot Spot Thermometer, add . . . **$ 650**
Forced-Air Cooling Equipment, add . **$1035**
Pressure Relief Device (Standard on Inerteen Units), add . . . . . **$ 130**
Pressure Vacuum Gauge, add . . . . . **$ 64**
Special Finish (Other than Standard – Page 1), add . . . . . **$ 350**

High Voltage Equipment

Unit Substation Throat (Coordinated with Switchgear), add . . . . **$ 260**
Bushing Current Transformer (Relay Accuracy), add . . . . . **$198 each**
High Voltage Air Terminal Chamber (15 Kv and Below), add . . . . . **$ 520**
High Voltage Oil Terminal Chamber (Includes Potheads) 15 Kv, add . . **$ 910**
25 Kv, add . . **$1319**
34 Kv, add . . **$1451**
Universal Wells . . . . . Refer to Westinghouse

Low Voltage Equipment

Same as 1 (HV), add . . . . . **$ 260**
Low Voltage Bus Duct Throat, add . . **$ 260**
Low Voltage Air Terminal Chamber
750 through 1000 Kva, add . . . . **$ 520**
1001 through 2500 Kva, add . . . . **$ 800**
2501 through 5000 Kva, add **$1067**

Further Information

SA-10099 – Westinghouse Rectangular Core Form Transformers.

M7205 – Why Westinghouse Rectangular Core Form Transformers Withstand Short Circuits

The Westinghouse policy of continuous improvement in its products may result in changes in these specifications without notice.

Westinghouse Electric Corporation
Small Power Transformer Division, South Boston, Va. 24592
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