

American National Standard for Transformers— Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller: High Voltage, 34500 Volts and Below: Low Voltage, 7970/13800Y Volts and Below

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American National Standards Institute, Inc.

The Institute of Electrical and Electronics Engineers, Inc.
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American National Standard

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Foreword (This Foreword is not part of American National Standard C57.12.20-1997)

In 1938 the EEI-NEMA (Edison Electric Institute-National Electrical Manufacturers Association) Joint Committee on Standards for Distribution Transformers was organized to develop standards for the various types of distribution transformers. For 23 years the continuous work of this Joint Committee was evidenced by a series of reports published jointly by the Edison Electric Institute (EEI) and the National Electrical Manufacturers Association (NEMA). The last report on overhead-type distribution transformers was the Seventh Report published in April 1961. The Joint Committee's last two reports on overhead-type distribution transformers were approved as American National Standards, the Seventh Report being reissued as American National Standard C57.12.20-1938-1962.

To avoid further duplication of effort and to simplify future revisions, the EEI-NEMA Joint Committee on Standards for Distribution Transformers was dissolved and replaced by new subcommittees of Accredited Standards Committee on Transformers, Regulators, and Reactors, C57. The work on standards for overhead-type distribution transformers was taken over by the Subcommittee on Distribution Transformers, Overhead and Pad-Mounted, C57.12.2.

This standard was prepared by IEEE Subcommittee C57.12.2 on behalf of C57 and is a revision of ANSI C57.12.20-1988, Requirements for Overhead-Type Distribution Transformers, 500 kVA and Smaller: High-Voltage, 67000 Volts and Below; Low-Voltage, 15000 Volts and Below. The previous edition was dated 1981. The 1981 revision included detailed requirements on relief of excessive pressure. The 1988 revision recognized the step-down and series-multiple designs in distribution transformers, and omitted the platform- or station-type transformer. In recognition of the dramatic reduction in catastrophic failures of overhead transformers since the formulation of NEMA Standards Proposal Number TR-P7-1975, the 1988 revision included in Section 8. this updated NEMA proposal that is now designated 2.02 of NEMA Standards Publication for Transformers, Regulators, and Reactors, NEMA TR 1-1980. The general industry consensus is that transformers that are built in conformance with this standard and that have adequate overcurrent protection, and recognizing the limitations included therein, will provide for enclosures with reasonable withstand capability.

Suggestions for improvement of this standard will be welcome. They should be sent to the National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, Virginia, 22209

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Transformers, Regulators, and Reactors, C57. Committee approval of the standard does not necessarily imply that all committee members voted for its approval.

At the time it approved this standard, the C57 Committee had the following members:

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AMERICAN NATIONAL STANDARD for Transformers— Standard For Overhead Type Distribution Transformers, 500 kVA and Smaller: High Voltage, 34500 Volts and Below; Low Voltage, 7970/13800Y Volts and Below

1. Scope

1.1

This standard is intended for use as a basis for determining the performance, interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment.

1.2

This standard covers certain electrical, dimensional, and mechanical characteristics and takes into consideration certain safety features of single- and three-phase, 60-Hz, mineral-oil-immersed, self-cooled, overhead-type distribution transformers 500 kVA and smaller, with high voltages 34500 volts and below and low voltages 7970/13800Y volts and below. Such transformers may include one or more of the following features:

- 1) High-voltage, overcurrent protection
- 2) High-voltage, overvoltage protection
- 3) Low-voltage, overcurrent protection
- 4) Low-voltage, overvoltage protection

NOTE — For polychlorinated-biphenyl (PCB) contamination in transformers, refer to the latest federal regulations.

2. Referenced and related publications

2.1 Referenced American National Standards

This standard is intended for use in conjunction with the following American National Standards. All characteristics, definitions, terminology, voltage designations, and tests, except as specified herein, shall be in accordance with these referenced American National Standards. When the following referenced standards are superseded by a revision approved by the American National Standards Institute, Inc., the latest revision shall apply.

ANSI C57.12.70, *Terminal Markings and Connections for Distribution and Power Transformers*

ANSI C135.1, *Galvanized Steel Bolts and Nuts for Overhead Line Construction*

ANSI/IEEE C37.40 and C37.40a, *Service Conditions and Definitions for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories*

ANSI/IEEE C37.41, *Design Tests for High-Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches, and Accessories*

ANSI/IEEE C57.12.00, *General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers*

ANSI/IEEE C57.12.80, *Terminology for Power and Distribution Transformers*

ANSI/IEEE C57.12.90, *Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and Guide for Short-Circuit Testing of Distribution and Power Transformers*

ANSI/IEEE C57.91, *Guide for Loading Mineral-Oil-Immersed Overhead and Pad-Mounted Distribution Transformers Rated 500 kVA and Less with 65°C or 55° Average Winding Rise*

2.2 Related publications

The following publications are listed for information only and are not essential for the completion of the requirements of this standard: (Latest Revision shall apply)

NEMA MG2, *Safety Standard for Construction and Guide for Selection, Installation, and Use of Electric Motors* (available from National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, Virginia 22209).

NEMA TR 1, *Transformers, Regulators, and Reactors* (available from National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, Virginia 22209).

MIL-STD-209C, *Swinging Eyes and Attachments for Lifting and Tying Down Military Equipment*. (available from Commanding Officer, Naval Publications and Forms, 5801 Tabor Avenue, Philadelphia, PA 19120).

3. Ratings

3.1 Kilovolt-ampere ratings

Kilovolt-ampere ratings are continuous and are based on not exceeding either a 65°C average winding temperature rise or an 80°C hot-spot temperature rise. The temperature rise of the insulating oil shall not exceed 65°C when measured near the top of the tank. Kilovolt-ampere ratings for single-phase and three-phase transformers shall be as shown in Table 1. These ratings are based on the usual temperature and altitude service conditions specified in ANSI/IEEE C57.12.00 .

3.2 Voltage ratings and tap ratings

3.2.1

Voltage ratings for single-phase and three-phase transformers shall be in accordance with Tables 2, 3, and 4. No taps are to be provided unless otherwise specified in accordance with 3.2.2

3.2.2

When specified, tap ratings for single- and three-phase transformers shall be in accordance with Table 5. All tap ratings shall be at rated kilovolt-amperes, except as otherwise indicated. Voltages in Tables 2, 3, and 4 are without taps

Table 1— Kilovolt-ampere ratings

Single Phase	Three Phase
10	30
15	45
25	75
37-1/2	112-1/2
50	150
75	225
100	300
167	500
250	
333	
500	

Table 2— Ratings for single-phase transformers (single ratio)

Transformer High Voltage	Minimum kVA Rating for Low Voltage Rating of:					
Rating	BIL (kV)	120/240 ⁽¹⁾	277 or 240/480 ⁽¹⁾	2400 or 4800	7200 or 7620 or 7970	Table 7 Figure Reference
2400/4160Y	60	10	10	---	---	9
4800/8320Y	75	10	10	---	---	9
7200/12470Y	95	10	10	50	---	10
12 470GrdY/7200	95	10	10	50	---	6, 7
7620/13 200Y	95	10	10	50	---	10
13 200GrdY/7620	95	10	10	50	---	6, 7
12 000	95	10	10	50	50	10, 11
13 200/22 860Y ⁽²⁾	125	10	10	50	50	10, 11
13 200	95	10	10	50	50	10, 11
13 800GrdY/7970	95	10	10	50	---	6, 7
13 800/23 900Y ⁽²⁾	125	10	10	50	50	10, 11
13 800	95	10	10	50	50	10, 11
14 400/24 940Y ⁽²⁾	125	10	10	50	50	10, 11
24 940GrdY/14 400 ⁽²⁾	125	10	10	50	50	6, 7, 8
16 340	95	10	10	50	50	10, 11
34 500GrdY/19 920 ^{(3) (4)}	150	10	10	50	50	6, 7, 8
34 500	200	25	25	50	50	10, 11

(1) Low-voltage rating of 120/240 volts or 240/480 volts is suitable for series, multiple, or three-wire service

(2) Suitable for wye-connection on systems where ground connections permit the use of 18-kV arresters

(3) Suitable for wye-connection on systems where ground connections permit the use of 27-kV arresters

(4) 125 KV BIL may be used based on user vendor agreement

Table 3— Ratings for single-phase transformers (series — multiple)

Transformer High Voltage	Minimum kVA Rating for Low Voltage Rating of:				
Rating	Minimum BIL (kV) ⁽¹⁾	120/240 ⁽²⁾	277 or 240/480 ⁽²⁾	2400 or 4800	Figure Table 8 Reference
2400/4160Y x 7200/12 470Y	60 x 95	10	10	50	10
4160GrdY/2400 x 12 470GrdY/7200	60 x 95	10	10	---	6, 7
2400/4160Y x 7620/13 200Y	60 x 95	10	10	50	10
4160GrdY/2400 x 13 200GrdY/7620	60 x 95	10	10	---	6, 7
4800/8320Y x 7200/12 470Y	75 x 95	10	10	50	10
8320GrdY/4800 x 12 470GrdY/7200	75 x 95	10	10	---	6, 7
4800/8320Y x 7620/13 200Y	75 x 95	10	10	50	10
8320GrdY/4800 x 13 200GrdY/7620	75 x 95	10	10	---	6, 7
7200/12 470Y x 14 400/24 940Y	95 x 125	10	10	50	10
12 470GrdY/7200 x 24 940GrdY/14 400	95 x 125	10	10	---	6, 7
7620/13 200Y x 14 400/24 940Y	95 x 125	10	10	50	10
13 200GrdY/7620 x 24 940GrdY/14 400	95 x 125	10	10	---	6, 7

(1) Arrester coordination may require higher BIL on Multiple connection than indicated to achieve a minimum protective level of 20%.

(2) Low-voltage rating of 120/240 volts or 240/480 volts is suitable for series, multiple, or three-wire service

Table 4— Ratings for three-phase transformers

Transformer High Voltage		Minimum kVA Rating for Low Voltage Rating of:					
Rating ⁽¹⁾	Minimum BIL (kV)	208Y/120	240 or 480	240 x 480	480Y/277	2400 or 4160Y/2400 or 4800 or 8320Y/4800	Table 15 Figure Reference
2400	45	30	30	30	30	---	12
4160Y/2400	60	30	---	---	30	---	12
4160Y	60	30	30	30	---	---	12
4160	60	30	30	30	30	---	12
4800	60	30	30	30	30	---	12
8320Y/4800	75	30	---	---	30	---	12
8320Y	75	---	30	30	---	---	12
7200	75	30	30	30	30	150	13
12 000	95	30	30	30	30	150	13
12 470Y/7200	95	30	---	---	30	---	13
12 470Y	95	---	30	30	---	---	13
13 200Y/7620	95	30	---	---	30	---	13
13 200Y	95	---	30	30	---	---	13
13 200	95	30	---	30	30	150	13
13 800	95	30	30	30	30	150	13
13 800GrdY/7970	95	30	---	---	30	---	13
24 940GrdY/14 400	125	30	---	---	30	---	13
34 500GrdY/19 920	150	30	---	---	30	---	13

(1) All transformers are delta-connected unless otherwise specified

Table 5— Recommended taps for single-phase and three-phase transformers

Winding Voltage		Above Rating	Below Rating
The Following Options are available for All Voltages:			
2400/4160Y 4800/8320Y 7200/12470Y 12 470GrdY/7200 7620/13 200Y 13 200GrdY/7620 12 000 13 200/22 860Y 13 200 13 800GrdY/7970 34 500GrdY/19 920	Option 1 Option 2	(2) 2 - 1/2% None	(2) 2 - 1/2% (4) 2 - 1/2%
13 800/23 900Y 13 800 14 400/24 940Y 16 340 ⁽¹⁾ 24 940GrdY/14 400		14 400/14 100 14 400/14 100 None 17 200/16 770 None	13 500/13 200 13 500/13 200 13 800/13 200/12 870/12 540 15 910/15 480 13 800/13 200/12 870/12 540

(1)Single Phase Only.

NOTE — No taps will be supplied if taps are not specified.

4. Basic lightning impulse insulation levels and dielectric test levels

4.1

Basic lightning impulse insulation levels (BILs) shall be as shown in Tables 2, 3, and 4.

4.2

Dielectric test levels shall be in accordance with the distribution levels specified in ANSI/IEEE C57.12.00 .

5. Tests

5.1 General

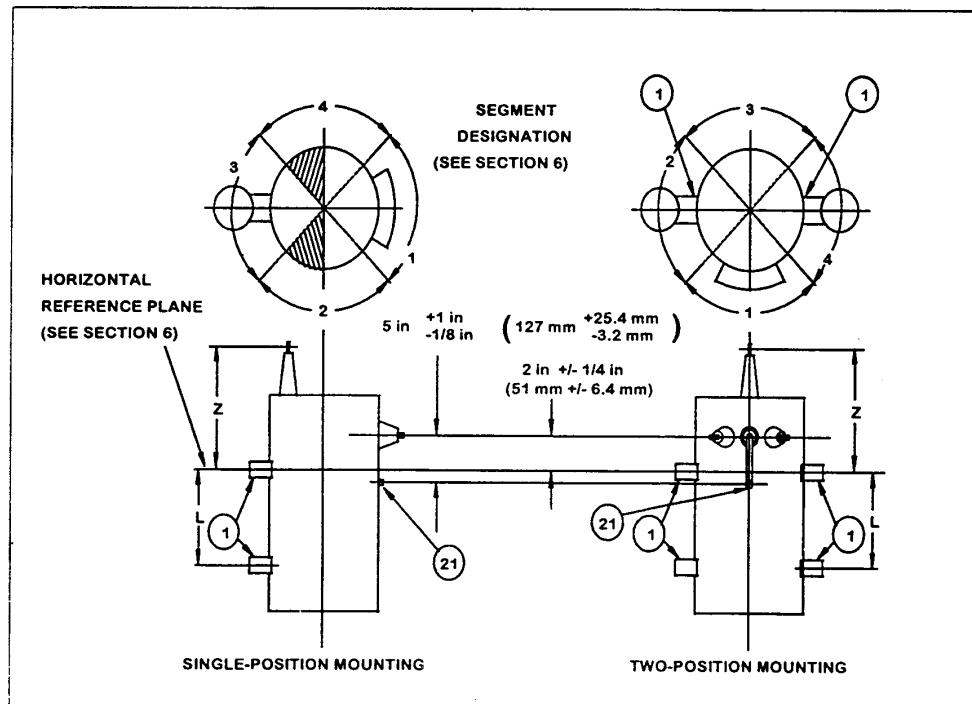
Except as specified in 5.2, tests shall be performed as specified in ANSI/IEEE C57.12.00 and in ANSI/IEEE C57.12.90 .

5.2 Dielectric tests

For single-phase transformers with a BIL of 150 kV or less that have one high-voltage bushing and a high-voltage terminal permanently connected to ground, no applied-voltage test is required. Induced-voltage tests shall be performed by applying between the terminals of one winding a voltage that will be developed from the high-voltage line terminals to ground. This voltage shall be 1000 volts plus 3.46 times the rated transformer winding voltage, but in no case shall the line-to-ground voltage developed exceed 40 000 volts for 125 kV BIL or 50 000 volts for 150 kV BIL. For this test the neutral terminal shall be grounded. An applied potential test shall be applied on the low-voltage winding.

6. Construction

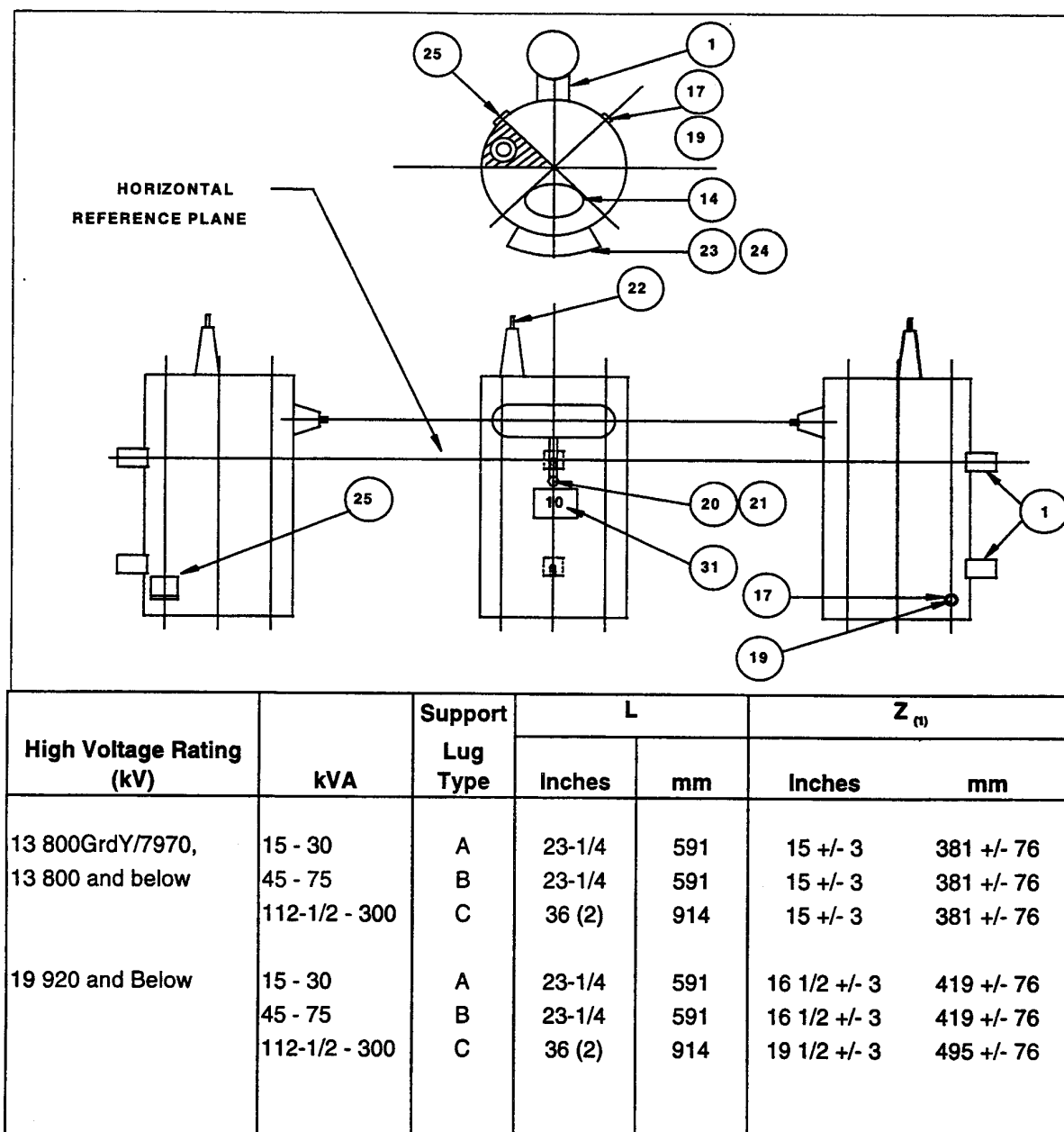
For the purpose of this standard, two principal reference locations have been established, as shown in Figures 1 and 2. The first of these is a horizontal plane that passes through the top of the bolt slot in the upper support lug. For the second, the transformer cover has been divided into four segments. The segments are numbered in a clockwise direction with the centerline of segment 1 on the centerline of the low-voltage bushings, as shown in Figures 1 and 2.



High Voltage Rating (kV)	kVA	Support Lug Type	L		Z ⁽¹⁾	
			Inches	mm	Inches	mm
7.62/13.2Y and below, 13.8GrdY/7.97 and below, and 12	10 - 50	A	11-1/4	286	15 +/- 3	381 +/- 76
	75 - 167	B	23-1/4	591	15 +/- 3	381 +/- 76
	250 - 333	C	24	610	15 +/- 3	381 +/- 76
	500	C	36	914	15 +/- 3	381 +/- 76
13.2/22.86Y to 14.4/24.94Y, 24.94GrdY/14.4, 34.5 GrdY/19.92, and 16.34	10 - 50	A	11-1/4	286	16-1/2 +/- 3	419 +/- 76
	75 - 167	B	23-1/4	591	16-1/2 +/- 3	419 +/- 76
	250 - 333	C	24	610	19-1/2 +/- 3	495 +/- 76
	500	C	36	914	19-1/2 +/- 3	495 +/- 76

(1) Z dimension applies only to high-voltage cover bushing transformers.

Figure 1— Segment designations and interchangeability dimensions for single phase transformers



(1) Z dimension applies only to high-voltage cover bushing transformers.

(2) 24-inch (610 mm) spacing may be used when tank height will not permit the 36-inch (914 mm) dimension

Figure 2— Segment designations and interchangeability dimensions for three phase transformers

Table 6— Electrical characteristics of bushings

BIL Withstand (kV)	Creepage Distance ⁽¹⁾		60-Hz Dry 1-Minute Withstand (kV)	60-Hz Wet 1-Minute Withstand (kV)
	Inches	Millimeters		
30	---	---	10	6
45	---	---	15	13
60	---	---	21	20
75	---	---	27	24
95	10-1/2 +/- 1/2	267 +/- 13	35	30
150	17	432	60	50
Single Phase Transformer Bushings Only				
95 ⁽²⁾	16-1/2 +/- 1-1/2	419 +/- 38	35	30
125	16-1/2 +/- 1-1/2	419 +/- 38	42	36
200	26	660	80	75

(1) Creepage distances are minimum values where no tolerance is specified.

(2) For 16.34 kV rating only.

6.1 Bushings and terminals

6.1.1 Bushings

6.1.1.1

Electrical characteristics of transformer bushings shall be as listed in Table 6.

6.1.1.2

The number, location, and arrangement of bushings for single-phase and three-phase transformers shall be as shown in Tables 7, 8, 9, and 15, and Figure 3. The centerline of the high-voltage bushings shall be located within the shaded areas. The positions of high-voltage bushings for three-phase transformers need not be symmetrical. Low-voltage bushings shall be of the sidewall or cover type and shall be individually mounted.

6.1.1.3

Unless otherwise specified, the color of bushings shall match Light Gray Number 70, Munsell Notation 5BG7.0/0.4.

6.1.2 Terminals

6.1.2.1

Terminal details shall be as shown in Figure 4.

6.1.2.2

High-voltage bushings of transformers 200 kV BIL and below shall be equipped with tinned, copper-alloy solderless connectors. High-voltage terminal sizes shall be as shown in Tables 10 and 11.

6.1.2.3

Low-voltage terminal sizes shall be as shown in Tables 12 and 13.

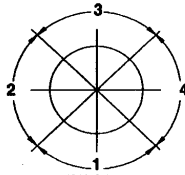
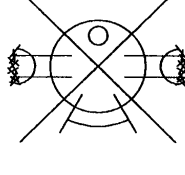
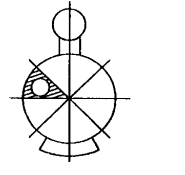
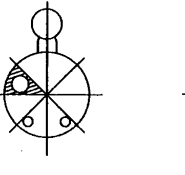
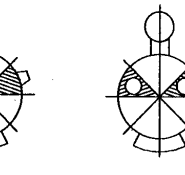
6.1.2.4

Terminals of low-voltage windings 600 volts and below shall be arranged for vertical take-off.

6.1.2.5

External spacing between low-voltage bushing terminals shall be such as to provide the maximum clearance between live metal parts in the working area. For low-voltage ratings above 600 volts, the electrical characteristics of the bushings determine the spacing. For low-voltage ratings 600 volts and below, spacings shall be within the limits of Table 14.

Table 7— Accessory equipment for single-phase transformers (single-ratio)

Segment Designations																
Centerline of Low-Voltage Bushings																
																
Outline Drawing		Figure 6		Figure 7		Figure 8		Figure 9		Figure 10		Figure 11				
High Voltage (kV)		12.47GrdY/7.2 13.2GrdY/7.62 13.8GrdY/7.97 29.94GrdY/14.4 34.5GrdY/19.92		12.47GrdY/7.2 13.2GrdY/7.62 13.8GrdY/7.97 24.94GrdY/14.4 34.5GrdY/19.92		24.94GrdY/14.4 34.5GrdY/19.92		4.8/8.32Y and Below		7.2/12.47Y 7.62/13.2Y 13.2/22.86Y to 14.4/24.94Y 12, 13.2, 13.8, 16.34 and 34.5		13.2/22.86Y to 14.4/24.94Y 12, 13.2, 13.8, 16.34 and 34.5				
Low Voltage (volts)		600 and Below		5000 and Below		Above 5000		600 and Below		5000 and Below		Above 5000				
		kVA		kVA		kVA		kVA		kVA		kVA		kVA		
		10 to 50	75 to 100	10 to 50	75 to 100	250 to 500	75 to 100	250 to 500	10 to 50	75 to 100	250 to 500	10 to 50	75 to 100	250 to 500	75 to 100	250 to 500
Item Number	Selection Reference	Accessory Equipment														
1	6.5.2	Support lug - Type	A	A	B	B	C	A	B	C	A	B	C	A	B	C
5	6.2.3	Liquid-level marking	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	6.2.1	Tap Changer (when specified)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	6.5.1	Handhole in cover (1)	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16	6.2.4	Lifting Lugs	X	X	X	X	X	X	X	X	X	X	X	X	X	X
17	6.5.4.1	Tank grounding provision	X	X	X	X	X	X	X	X	X	X	X	X	X	X
19	6.5.4.2	Tank grounding connector	X	X	X	X	X	X	X	X	X	X	X	X	X	X
20	6.5.4.3	Low-voltage grounding connection (2)	X	X	X	---	---	---	---	---	---	---	---	---	---	---
21	6.5.4.4	Low-voltage grounding provision (3)	X	X	X	X	---	---	---	---	---	---	---	---	---	---
22	6.1.2.2	High-voltage bushing terminals	X	X	X	X	X	X	X	X	X	X	X	X	X	X
23	6.1.2.3	Low-voltage bushing terminals	X	X	X	X	X	X	X	X	X	X	X	X	X	X
24	6.1.1.2	Low-voltage bushing arrangement	X	X	X	X	X	X	X	X	X	X	X	X	X	X
25	6.3.4.1.1	Nameplate Location	---	X	X	X	X	X	X	X	X	X	X	X	X	X
28	6.3.4.1.2	Nameplate Location	X	---	---	---	---	---	---	---	---	---	---	---	---	---
30	6.3.4.2	Nameplate - Type (5)	A	A	A	A	A	A	A	A	A	A	A	A	A	A
31	6.3.5	kVA rating on tank	X	X	X	X	X	X	X	X	X	X	X	X	X	X
32	6.2.5.1	Pressure-relief valve (4)	X	X	X	X	X	X	X	X	X	X	X	X	X	X

(1) Supplied only on units with internal tap changers.

(2) For 120/240 volts only.

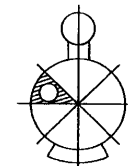
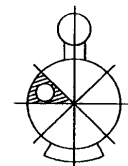
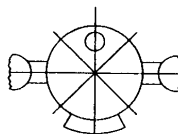
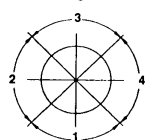
(3) For 240/480 volts and 277 volts.

(4) Segment location not specified. Not required if cover design is in accordance with 6.2.5.2.

(5) Nameplate shall show BIL for 34.5GrdY/19.92.

Table 8— Accessory Equipment for Single-Phase Transformers (Series-Multiple)

Segment Designations
Centerline of Low-Voltage
Bushings



Outline Drawing			Figure 6			Figure 7			Figure 10		
High Voltage (kV)			4.16GrdY/2.4 x 12.47GrdY/7.2			4.16GrdY/2.4 x 12.47GrdY/7.2			2.4/4.16Y x 7.2/12.47Y		
			4.16GrdY/2.4 x 13.2GrdY/7.62			4.16GrdY/2.4 x 13.2GrdY/7.62			2.4/4.16Y x 7.62/13.2Y		
			8.32GrdY/4.8 x 12.47GrdY/7.2			8.32GrdY/4.8 x 12.47GrdY/7.2			4.8/8.32Y x 7.2/12.47Y		
			8.32GrdY/4.8 x 13.2GrdY/7.62			8.32GrdY/4.8 x 13.2GrdY/7.62			4.8/8.32Y x 7.62/13.2Y		
			12.47GrdY/7.2 x 24.94GrdY/14.4			12.47GrdY/7.2 x 24.94GrdY/14.4			7.2/12.47Y x 14.4/24.94Y		
			13.2GrdY/7.62 x 24.94GrdY/14.4			13.2GrdY/7.62 x 24.94GrdY/14.4			7.62/13.2Y x 14.4/24.94Y		
Low Voltage (volts)			600 and Below			600 and Below			5000 and Below		
Item Number	Selection Reference	kVA	10	10	75	250	75	250			
			to 50	to 50	167 100	to 500	to 167	to 500			
1	6.5.2	Support lug - Type	A	A	B	B	C	A	B	C	
5	6.2.3	Liquid-level marking	X	X	X	X	X	X	X	X	
9	6.2.1	Tap Changer (when specified)	X	X	X	X	X	X	X	X	
14	6.5.1	Handhole in cover ⁽¹⁾	X	X	X	X	X	X	X	X	
16	6.2.4	Lifting Lugs	X	X	X	X	X	X	X	X	
17	6.5.4.1	Tank grounding provision	X	X	X	X	X	X	X	X	
19	6.5.4.2	Tank grounding connector	X	X	X	X	X	---	---	---	
20	6.5.4.3	Low-voltage grounding connection ⁽²⁾	X	X	X	---	---	---	---	---	
21	6.5.4.4	Low-voltage grounding provision ⁽³⁾	X	X	X	X	---	X	X	---	
22	6.1.2.2	High-voltage bushing terminals	X	X	X	X	X	X	X	X	
23	6.1.2.3	Low-voltage bushing terminals	X	X	X	X	X	X	X	X	
24	6.1.1.2	Low-voltage bushing arrangement	X	X	X	X	X	X	X	X	
25	6.3.4.1.1	Nameplate Location	---	X	X	X	X	X	X	X	
28	6.3.4.1.2	Nameplate Location	X	---	---	---	---	---	---	---	
30	6.3.4.2	Nameplate - Type	A	A	A	A	A	A	A	A	
31	6.3.5	kVA rating on tank	X	X	X	X	X	X	X	X	
32	6.2.5.1	Pressure-relief valve ⁽⁴⁾	X	X	X	X	X	X	X	X	
33	6.2.2	Series-Multiple Device	X	X	X	X	X	X	X	X	

(1) Supplied only on units with internal terminal boards.

(2) For 120/240 volts only.

(3) For 240/480 volts and 277 volts.

(4) Segment location not specified. Not required if cover design is in accordance with 6.2.5.2.