

ANSI Standard Dry Type Transformers

Nominal KVA	X-Former Resist. %R	X-Former Reactance %jX	X-Former Impedance %Z	Full Load per phase @ 120V 1Ø	Full Load per phase @ 240V 1Ø	Full Load per phase @ 208V 3Ø	208V 3Ø Transformer Short Circuit	Full Load per phase @ 480V 3Ø	480V 3Ø Transformer Short Circuit	Dimensions (WxDxH) & Weight of 480 to 208Y/120	BTU Heat Loss No Load	BTU Heat Loss Full Load
3	3.76	1	3.89	25	13	8	214	4	93	15x9x14 - 120#	376	563
6	2.72	1.72	3.22	50	25	17	518	7	224	15x9x14 - 145#	495	939
9	2.31	1.16	2.58	75	38	25	966	11	419	19x12x15 - 235#	666	1,280
15	2.1	1.82	2.78	125	63	42	1,498	18	649	20x16x27 - 200#	529	2,270
30	3.75	2.04	4.27	250	125	83	1,951	36	845	20x16x27 - 250#	854	6,128
45	2.73	1.97	3.37	375	188	125	3,710	54	1,608	20x20x30 - 340#	1,024	5,753
75	2.42	2.1	3.20	625	313	208	6,497	90	2,815	30x20x30 - 500#	1,366	8,654
112.5	2.56	3.69	4.49	938	469	312	6,953	135	3,013	30x24x37 - 750#	2,048	13,076
150	1.94	4.07	4.51	1,250	625	416	9,235	180	4,002	32x27x44 - 800#	2,390	15,124
225	1.95	4.8	5.18	1,875	938	625	12,054	271	5,224	35x29x50 - 1025#	3,073	19,784
300	1.7	4.96	5.24	2,500	1,250	833	15,882	361	6,882	41x32x50 - 1450#	3,755	24,120
500	1	4.8989	5.00	4,167	2,083	1,388	27,758	601	12,028	48x36x71 - 2100#	5,121	23,471
750	1	4.8989	5.00	6,250	3,125	2,082	41,636	902	18,042	56x41x74 - 3950#	7,169	34,447
1000	1	5.6623	5.75	8,333	4,167	2,776	48,274	1,203	20,919	72x54x94 - 6300#		
1500	1	5.6623	5.75	12,500	6,250	4,164	72,411	1,804	31,378			
2000	1	5.6623	5.75	16,667	8,333	5,551	96,548	2,406	41,838			
2500	1	5.6623	5.75	20,833	10,417	6,939	120,685	3,007	52,297			
3000	1	6.9282	7.00	25,000	12,500	8,327	118,960	3,608	51,549			
3750	1	6.9282	7.00	31,250	15,625	10,409	148,699	4,511	64,436			
5000	1	6.9282	7.00	41,667	20,833	13,879	198,266	6,014	85,915			
7500	1	6.9282	7.00	62,500	31,250	20,818	297,399	9,021	128,873			
10000	1	6.9282	7.00	83,333	41,667	27,757	396,532	12,028	171,831			
15000	1	6.9282	7.00	125,000	62,500	41,636	594,798	18,042	257,746			

This information is provided as a free engineering resource by Design & Construction Engineers. Transformer characteristics were compiled from various industry sources available from Cutler-Hammer, GE, Siemens, and Square D. Impedance is the vector sum of the listed DC resistance and the inductive reactance. The full load amperage is (KVA)(1000)/(Voltage). This is multiplied by the square root of 3 (1.73) for three-phase transformers. The short circuit current is the full load amperage divided by the impedance. The dimensions and weight are based on general purpose Square D 3-phase transformers.

Fault Current for OPPD Utility Transformers

1-Phase Transformers			
kVA	X-Former Impedance %Z	Full Load per Phase @ 240/120V	Fault Current @ 240V
10	1.16	42	3,600
15	1.60	63	3,900
25	1.55	104	6,700
50	1.68	208	12,400
75	1.63	313	19,200
100	1.50	417	27,800
167	1.50	696	46,400
250	1.61	1,042	64,500
333	2.80	1,388	49,500

3-Phase Transformers					
kVA	X-Former Impedance %Z	Full Load per Phase @ 208Y/120V	Fault Current @ 208V	Full Load per Phase @ 480Y/277V	Fault Current @ 480V
75	1.8	208	11,600	90	Don't Stock
150	1.8	416	23,200	180	10,100
225	1.6	625	39,100	271	17,000
300	1.6	833	52,100	361	22,600
500	2.2	1,388	63,100	601	27,400
750	5.75	2,082	36,200	902	15,700
1000	5.75	2,776	48,300	1,203	21,000
1500	5.75	4,164	Don't Stock	1,804	31,400
2000	5.75	5,551	Don't Stock	2,406	41,900
2500	5.75	6,939	Don't Stock	3,007	52,300

Copper Wire Properties @75° C - Ohms per 1000 Feet					
Conductor	PVC or AL Conduit Reactance X	Steel Conduit Reactance X	Conductor Resistance (DC @75° C)	PVC or AL Conduit Impedance Z	Steel Conduit Impedance Z
14	0.058	0.073	3.07	2.7	2.7
12	0.054	0.068	1.93	1.7	1.7
10	0.050	0.063	1.21	1.1	1.1
8	0.052	0.065	0.778	0.69	0.70
6	0.051	0.064	0.491	0.44	0.45
4	0.048	0.060	0.308	0.29	0.30
3	0.047	0.059	0.245	0.23	0.24
2	0.045	0.057	0.194	0.19	0.20
1	0.046	0.057	0.154	0.16	0.16
1/0	0.044	0.055	0.122	0.13	0.13
2/0	0.043	0.054	0.0967	0.11	0.11
3/0	0.042	0.052	0.0766	0.088	0.094
4/0	0.041	0.051	0.0608	0.074	0.080
250	0.041	0.052	0.0515	0.066	0.073
300	0.041	0.051	0.0429	0.059	0.065
350	0.040	0.050	0.0367	0.053	0.060
400	0.040	0.049	0.0321	0.049	0.056
500	0.039	0.048	0.0258	0.043	0.050
600	0.039	0.048	0.0214	0.040	0.047
750	0.038	0.048	0.0171	0.036	0.043
1000	0.037	0.046	0.0129	0.032	0.040

This information is provided as a free engineering service by Design & Construction Engineers. The transformer information was compiled from figures provided by OPPD which were current at the time but that are subject to change. The wire properties information is basically that which is found in Table 8 and 9 of the 2004 NEC. The conductor resistance is the DC resistance from Table 8 while the reactance and impedance (at 85% power factor) is from Table 9. Note that wire properties are much different from 20° C to 75° C. Voltage drops are based on wire impedance at 75° while short circuits are based on 20° C. This is because the greatest voltage drops occur when the wire is hot. In contrast, most short circuits occur when the circuit is first energized and the conductors are cold.

PHASE	TYPE	PRIMARY VOLTAGE	X-FORMER KVA	COMPANY NUMBER	SECONDARY VOLTAGE
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BLANK = 1 Ø 240/120
 C = 1 Ø 480/240
 D = 1 Ø 277
 E = 3 Ø 208Y/120
 F = 3 Ø 480Y/277
 G = 480
 H = 1 Ø 2400
 I = 3 Ø 2400
 J = 3 Ø 4160/2400
 S = SPECIAL
 X = 480 CONV.

AN OPPD COMPANY NUMBER SUCH AS "44"


- A = 0
- B = 1
- C = 1.5
- F = 3
- H = 5
- I = 7.5
- J = 10
- K = 15
- N = 25
- NI = 37.5
- O = 45
- P = 50
- Q = 75
- R = 100
- S = 150
- SI = 167
- T = 200
- TN = 225
- U = 250
- UP = 300
- V = 333
- W = 500
- Z = 750
- AB = 833
- AC = 1000
- AD = 1250
- AE = 1500
- AF = 2000
- AG = 2500
- AH = 3000
- AI = 3750
- AJ = 5000

- BLANK = 2400V
- 6 = 7200V
- 7 = 7620V
- 8 = 8000V
- 13 = FROM 12270 TO 15000V

- BLANK = OVERHEAD
- DB = DIRECT BURIED
- DY = DRY TYPE
- NW = NETWORK
- PM = PADMOUNT
- SS = SUBSTATION
- UG = SUBMERSIBLE (OR SUBWAY)

BLANK = SINGLE PHASE
 3 = THREE PHASE

NOTES: CURRENTLY INSTALLED 167KVA TRANSFORMERS MAY BE LABELLED AS AN "S". THEY WILL BE CHANGED TO "SI" THE NEXT TIME THEY GO THROUGH THE OPPD SHOP. IF PART #4 IS LISTED ONLY ONCE, SUCH AS "P", THEN THE TRANSFORMER HAS TAPS. IF PART #4 IS LISTED TWICE, SUCH AS "PP", THEN THE TRANSFORMER HAS NO TAPS.


DESIGN & CONSTRUCTION ENGINEERS
 DATE: 06/13/2004
 PROJECT #: NONE
 DRAWING REF: NONE

TRANSFORMER CODES FOR OPPD UTILITY TRANSFORMERS

SKETCH NO.
