
Transformer Test Report

MADDOX INDUSTRIAL TRANSFORMER

Order Number: FG-1572

Serial Number: 0318MT3475-S

March 27, 2018

Customer Information

Customer Name: MADDOX INDUSTRIAL TRANSFORMER
 Order Number: FG-1572
 Stock Number: MT3475-S
 Service Performed: Final Tests
 Date of test completion: 03/27/2018

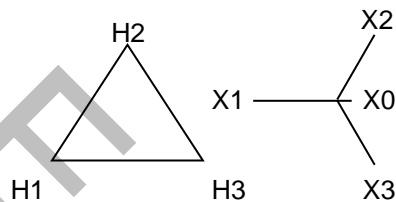
Transformer Information:

Manufacturer:	<u>MADDOX INDUSTRIAL TRANSFORMER</u>	HV Conductor:	<u>Aluminum</u>
Serial Number:	<u>0318MT3475-S</u>	LV Conductor:	<u>Aluminum</u>
kVA	<u>1,500</u>	@ Rise:	<u>65 °C</u>
kVA		@ Rise:	<u>°C</u>
High Voltage:		Impedance:	<u>5.20</u>
Line To Line:	<u>12,470</u>	Insulating Fluid:	
		Type:	<u>Mineral Oil</u>
Low Voltage:		Gallons Fluid:	<u>500</u>
Line To Line:	<u>4,160 Y</u>	Fluid Weight:	<u>3,750</u>
Line to Neutral:	<u>2,400</u>	Core & Coils:	<u>4,210</u>
HV BIL:	<u>95</u>	Tank & Fittings:	<u>3,180</u>
LV BIL:	<u>60</u>	Total Weight:	<u>11,140</u>
Frequency:	<u>60</u>	Power Class:	<u>Distribution</u>
Cooling Class:	<u>ONAN</u>	Rated Ambient:	<u>20 °C</u>

HV Tap Ratings:

Tap	Rating
1	13,094
2	12,782
3	12,470
4	12,158
5	11,847

Configuration:



Test Summary--1500 KVA @ 85°C

No-Load Watts	2255
Load Loss Watts	11,760
Total Watts	14015
Total HV Resistance Ω	4.676599576
Total LV Resistance Ω	0.079667373

% Impedance	5.415
% Resistance	0.784
% Reactance	5.358
% Excitation	0.363

Regulation at Base Rated kVA

PF	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60
%Reg	0.9263	2.5323	3.1384	3.5717	3.9120	4.1907	4.4238	4.6211	4.7886

Efficiency at Base Rated kVA

%Eff	Power Factor								
%Load	1.00	0.95	0.90	0.85	0.80	0.75	0.70	0.65	0.60
5%	97.0442	96.8934	96.7265	96.5406	96.3323	96.0973	95.8302	95.5238	95.1688
10%	98.4429	98.3623	98.2729	98.1731	98.0612	97.9346	97.7903	97.6244	97.4315
15%	98.8926	98.8350	98.7710	98.6997	98.6195	98.5289	98.4254	98.3064	98.1678
20%	99.0997	99.0528	99.0007	98.9425	98.8772	98.8032	98.7188	98.6216	98.5085
25%	99.2090	99.1677	99.1219	99.0707	99.0132	98.9481	98.8738	98.7882	98.6885
30%	99.2691	99.2309	99.1885	99.1412	99.0880	99.0278	98.9591	98.8799	98.7877
35%	99.3010	99.2645	99.2239	99.1787	99.1278	99.0702	99.0044	98.9286	98.8404
40%	99.3153	99.2795	99.2398	99.1954	99.1456	99.0891	99.0247	98.9505	98.8640
45%	99.3178	99.2822	99.2426	99.1984	99.1487	99.0925	99.0283	98.9543	98.8682
50%	99.3121	99.2762	99.2362	99.1917	99.1416	99.0849	99.0202	98.9456	98.8587
55%	99.3004	99.2638	99.2233	99.1780	99.1270	99.0694	99.0036	98.9277	98.8394
60%	99.2842	99.2468	99.2053	99.1590	99.1069	99.0479	98.9806	98.9030	98.8127
65%	99.2646	99.2262	99.1835	99.1359	99.0824	99.0218	98.9527	98.8730	98.7803
70%	99.2422	99.2027	99.1587	99.1097	99.0546	98.9922	98.9210	98.8389	98.7434
75%	99.2177	99.1769	99.1316	99.0809	99.0241	98.9597	98.8862	98.8015	98.7030
80%	99.1915	99.1493	99.1024	99.0501	98.9914	98.9249	98.8490	98.7615	98.6597
85%	99.1638	99.1202	99.0717	99.0177	98.9569	98.8882	98.8097	98.7193	98.6140
90%	99.1349	99.0898	99.0397	98.9838	98.9210	98.8499	98.7687	98.6753	98.5665
95%	99.1050	99.0584	99.0066	98.9488	98.8838	98.8103	98.7264	98.6297	98.5172
100%	99.0743	99.0261	98.9725	98.9127	98.8456	98.7696	98.6828	98.5829	98.4667
125%	98.9117	98.8551	98.7922	98.7221	98.6433	98.5542	98.4525	98.3355	98.1992
150%	98.7399	98.6744	98.6018	98.5208	98.4298	98.3268	98.2095	98.0744	97.9173
200%	98.3834	98.2998	98.2070	98.1035	97.9874	97.8561	97.7065	97.5344	97.3344

Winding Tests

Turns Ratio

TAP	Volts	A ϕ	B ϕ	C ϕ	CALC	RANGE	
1	13,094	5.4626	5.4623	5.4620	5.4556	5.4829	5.4283
2	12,782	5.3357	5.3357	5.3337	5.3257	5.3524	5.2991
3	12,470	5.1986	5.1986	5.1966	5.1958	5.2218	5.1699
4	12,158	5.0720	5.0719	5.0699	5.0659	5.0913	5.0406
5	11,847	4.9445	4.9447	4.9432	4.9360	4.9607	4.9114
LV	4,160	H1-H3 X1-X0	H2-H1 X2-X0	H3-H2 X3-X0			

Winding Resistance

High Voltage

Temperature: 11.0 °C

Tap	Volts	H1-H3	H2-H1	H3-H2	
1	13,094	0.8304	0.8261	0.8378	Ω
2	12,782	0.8112	0.8070	0.8184	Ω
3	12,470	0.7902	0.7861	0.7972	Ω
4	12,158	0.7714	0.7680	0.7782	Ω
5	11,847	0.7521	0.7487	0.7585	Ω

Low Voltage

Temperature: 11.0 °C

	Volts	X1-X0	X2-X0	X3-X0	
LV	4,160	0.020250	0.020520	0.019880	Ω

Insulation Tests

Megger

Oil Temperature: 11 °C

Humidity: _____ %

Air Temperature: 11 °C

	Measured	Corrected to 20°C	@	
High-Low:	<u>87.9</u> G Ω	<u>47,818</u> M Ω	@	<u>5,000</u> Volts
High-Ground:	<u>131.0</u> G Ω	<u>71,264</u> M Ω	@	<u>5,000</u> Volts
Low-Ground:	<u>96.6</u> G Ω	<u>52,550</u> M Ω	@	<u>1,000</u> Volts

Power Tests

Core Loss/ No-Load Losses--100%

Temp: 13.4 °C

Low Voltage--100%: 4,160

Bench Values

Voltage Reading:	AB	BC	CA	Average
Current Reading:	A	B	C	
AVE Volts	415.52	465.07	418.52	433.0
RMS Volts	437.39	489.55	440.55	455.8
Exciting Amps	15.12	12.04	14.00	13.720
Measured Watts	3,760	Corrected Watts		3,567
Calculated Volts	3,600.9	4,030.3	3,626.9	3,752.7
Calculated Amps	0.787	0.812	0.669	0.756

Watts Corrections	
Watts	Temp
2,160	85°C
2,255	20°C
2,265	13.4°C

% Excitation: 0.363

Step-Up Transformer No-Load Values

Voltage Connection:	AB	BC	CA	Average
Current Connection:	A	B	C	
AVE Volts	479.1	484.4	479.9	481.1
RMS Volts	478.3	483.8	479.6	480.6
Exciting Amps	8.300	5.000	8.200	7.167
Measured Watts	1,300	Corrected Watts		1,302

Step-Up Ratio: 8.666

Copper Loss/ Load Loss Tap 3

High Voltage Tap: 3

Temp: 13.4 °C

Shorting Strap Resistance= 174 μΩ

Current Ratings: HV: 69.4

LV: 208

Extrapolated Values:

HV	Winding	Voltage	Current
A	AB	673.0	70.73
B	BC	669.1	68.72
C	CA	676.2	68.90
Averages:		672.7	69.45

Extrapolation Factor: 1.5644

Watts:	9,471	Measured
Watts:	7	-Strap Loss
Watts:	9,464	Uncorrected
Watts:	8,437	I ² R Uncorrected
Watts:	1,027	Stray Uncorrected
Watts:	10,971	I ² R Corrected
Watts:	789	Stray Corrected
Watts:	11,760	Total Corrected

Observed Values:

HV	Winding	Voltage	Current	Watts
A	AB	430.2	45.21	3,870
B	BC	427.7	43.93	
C	CA	432.2	44.04	
Averages:		430.0	44.39	

% IX: 5.358

% IR Uncorrected: 0.631

% IR Corrected: 0.784

% IZ Uncorrected: 5.395

% IZ Corrected: 5.415