

Customer Repair Evaluation Report

PD DEAL #: 0000000000 | EVALUATION TECH: | KVA: 3400 | HV: 34500 | LV: 12000Y/6930

Evaluation Process

1. Performed Megger/Turn Ratio/Winding Resistance tests
2. Visual inspection of core and coil assembly for customer reported failure
3. Visual inspection of external assembly - cabinet, tank, radiators, and other components
4. DGA pulled for transformer fluid - Mineral Oil (1386 gallons)

Testing

Megger Insulation Test

	Test Setup	Min Value Required (MΩ)	Recorded Value	
			Before Framing	After Tanking
1	Hi - Low	1,000	5.7 g	
2	Hi - Ground	1,000	4.74 g	
3	Low - Ground	1,000	1.36 g	

PASS

Notes: We look for Megger results to be above 1G Ohm, a Turns Ratio that is within .5% error of calculated values, and resistance values that do not vary more than 2% phase to phase. These values were obtained by hooking up straight to the core and coils.

Ratio Test: Recorded After Tanking – Attach results if 3 phase TTR device is used

35363	5.103	5.119	5.122	5.126
34500	4.978	4.991	4.992	4.996
33638	4.854	4.867	4.869	4.873
32775	4.729	4.743	4.745	4.749

PASS

High Voltage Resistance Test:

H1 Ω	H2 Ω	H3 Ωt
1.0029	.9918	1.0113
.976	.9654	.973
.9505	.940	.9445
.9272	.9168	.9217
.9045	.9031	.901

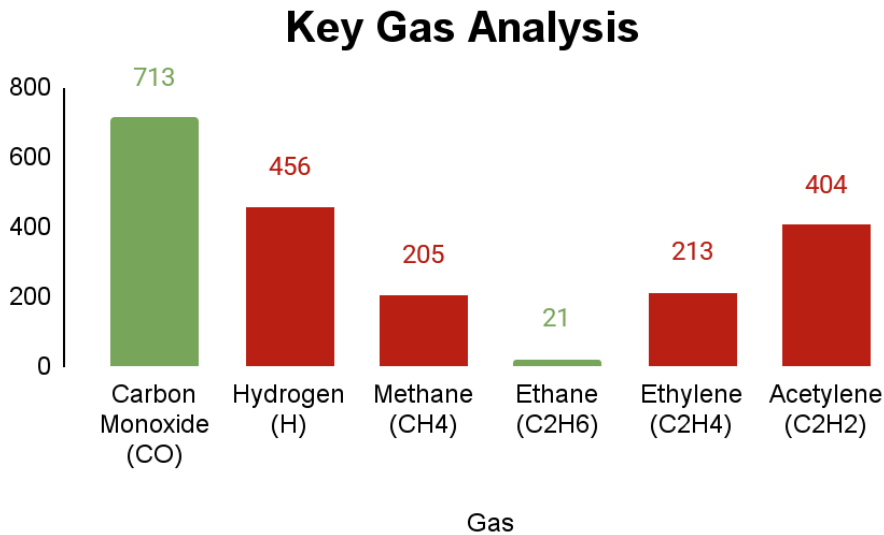
PASS

Low Voltage Resistance Test:

X1 mΩ	X2 mΩ	X3 mΩ
55.865	57.125	55.955

PASS

Dissolved Gas Analysis (DGA):



Notes: DGA high in combustible gasses from blown CLF and HV bushing failure

Other Findings From Evaluation:

1. CLF on phase 3 has blown
2. HV Bushings show carbon patterns internally that are synonymous with electrical arcing. These older style 34.5kV/600 amp bushings do not contain an internal ground screen, leading to the patterns you see in the pictures below.
3. Double nut on HV side is not the best secure connection because of the thickness of the tabs on the core leads. There should be a lock washer or thinner nut so it is completely secured on the threads.
4. Kickplate damage in need of straightening

External Inspection Photos:



ANSI 1



ANSI 2



ANSI 3



ANSI 4

External Damage Photos:

Cabinet/Tank Dents/Bends



Slight kickplate damage in need of straightening.

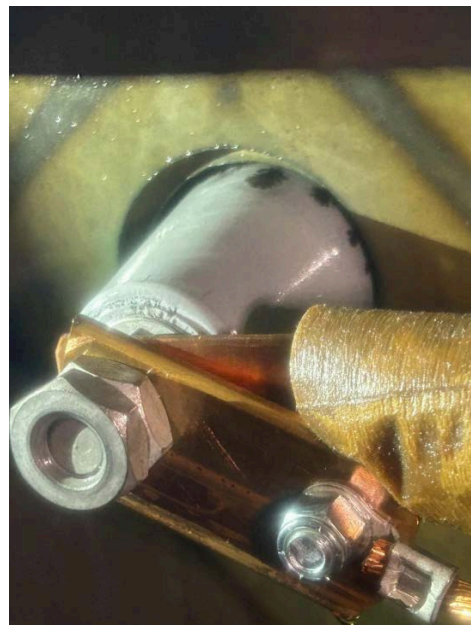
Internal Inspection Photos:

HV Bushing Failure



Here you can see where the creep/arcing issue occurred because of the lack of ground screen.

High Side Connection



The lock nut on this connection is just starting its thread on the stud - not a secure and locking connection.

Recommendation for Repair:

1. Untank core and coils for further inspection and bakeout
2. Remove components that provide seal surface for fluid and regasket
3. Replace CLF's with **NEW 38kV 165 Amp CLF (HTSS372165)**
4. Replace HV bushings with **six (6) NEW 34.5KV/600amp DB Bushings (Ensuring these are secured correctly internally via lock washer or thinner lock nut)**
5. Replace PRD with **NEW 8lb PRD**
6. Replace Mineral Oil with **New Mineral Oil**
7. Perform Core final test protocol:
 - a. Megger/Insulation winding resistance: H-L, H-G, L-G
 - b. Turns Ratio: All Tap Voltages
 - c. Winding Resistance: All Taps on HV side, LV all phases
 - d. No Load/Excitation Test
 - e. Full Load/ Impedance % Test.
8. Pressure test unit
9. Repaint transformer with ASA 32 Green industrial base oil enamel paint.
10. Perform Core Final QC outgoing documentation process.