



Oil Analysis Report [OLXX03]

Demo Company - All Modules

Site 1

Tag Number: PT4545

Wednesday, November 4, 2020

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Historical results from other laborartories provided by our Clients are included for reference and diagnosis purposes.

Accredited for compliance with ISO/IEC 17025 - Testing

Sampled in accordance with ASTM D923 - Sampling Electrical Insulating Liquids.

1300 736 091 info@txmonitor.com www.txmonitor.com TxMonitor, Unit 2/15 Hector Street (West), Osborne Park, WA 6017

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Fails – Results are outside the standard guidelines

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Asset Review (This section is not part of the scope of NATA accreditation)

[IEEE C57-104 (DGA): Alarm] [IEEE C57-106 (Oil Quality): Fair]

Title: Interpretation of Dissolved Gas Analysis as per IEEE C57-104.

This sample is classified as DGA Status 3. Hydrogen, Methane, Ethane, Ethylene and Acetylene levels are exceedingly elevated.

High concentrations of Hydrogen, with the addition of minor quantities of Ethane, Ethylene and Methane may indicate low energy partial discharges or possible stray gassing. Carbon Monoxide and Carbon Dioxide concentrations are low indicating no abnormal cellulose insulation degradation.

Title: Interpretation of Oil Quality Properties as per IEEE C57-106.

OQIN is acceptable.

Furanic Compounds level is low. Based on the classification provided by the FIST standard the Estimated life remaining in the paper is 66%.

Calculated DP is 496 which is considered to be an accelerated rate of aging.

Based on the classification provided by IEC 60296 Table 2 for Inhibitor content and the analysis results, this oil is classified as: (T) "Trace inhibited oil" < 0.08%.

Corrosive sulphur analysis was performed with the following results: ASTM1275B: Non Corrosive: 1a - Slight Tarnish Light Orange, almost the same as freshly polished strip

Particle count indicates a normal contamination level. This contamination level is good and is considered typical for transformers in service.

Power Factor (DDF) result at 25°C is within the recommended IEEE guidelines.

Power Factor (DDF) result at 100°C is within the recommended IEEE guidelines.

This unit is class as PCB-free - Containing less than 2ppm of PCB's

Degree of polymerisation is low. DP result is 350 which is considered to be an excessive rate of aging with a high risk of failure. Based on the classification provided by the FIST standard the Estimated life remaining in the paper is 40%.

All other Oil Quality properties are within the recommended guidelines.

Assessment:	Urgent	Next Sampling Date: 01/Feb/2021
Approved By:	Hayley Coulson Oil Laboratory Manager	Alas
essment Code Legend	hy/normal condition. The available data does not in	dicate an active fault mechanism

As

Ac Caution: Alert condition. There is an indication of an active fault mechanism in its early stages of development. Urgent: Alarm condition. An active fault mechanism is highly likely and prompt attention to this asset is required. **Oil Analysis Report**

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NATA	
WORLD RECOGNISED	

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nalysis Resu	ults (cont. on Page 5)		Sample I	dentification: La	test sample taken	by TxMonitor/N	lachinemonit	
		Sample Date	01/Nov/2020	24/Feb/2015	23/Jan/2011			
		Analysis Date	04/Nov/2020	28/Feb/2015	27/Jan/2011			
		Report Date	04/Nov/2020	04/Mar/2015	03/Feb/2011			
		Temp °C *	35	25	31			
		Laboratory	TxMonitor	TxMonitor	TxMonitor			
		Sample ID	TX0003	TX002	TX0001			
Dissolved Gas	Analysis: ± denotes MU							
Method C - ppm	n at an STP of 0°C and 760 torr							
ASTM-D3612	Hydrogen (H ₂)	PPM (±14)	704	450	350			
ASTM-D3612	Methane (CH₄)	PPM (±13)	500	250	174			
ASTM-D3612	Ethvlene (C ₂ H ₄)	PPM (+15)	500	50	34			
ASTM-D3612	Ethane (C ₂ H ₄)	PPM (+16)	500	65	40			
ASTM-D3612	Acetylene (C ₂ H ₂)	PPM (+16)	25	25	5			
ASTM-D3612	Carbon Monoxide (CO)	PPM (+272)	99	501	399	_		
ASTM-D3612	Carbon Dioxide (CO ₂)	PPM (+1992)	990	600	2490	_		
ASTM-D3612		PPM (+204)	600	200	150			
ASTM-D3612	Nitrogon (N.)	DDM (±1105)	12 850	548	25			
		PPM	2.328	1.340	1.003			
			2,020	1,010	1,000			
Oil Quality Tes	sts: ± denotes MU							
ASTM-D974	Acidity	maKOH/a (+0.01)	0.02	0.01	0.01			
ASTM-D1500	Colour	-	<0.5	<0.5	<0.5			
ASTM-D1533	Water Content	PPM (±6)	7	5	6			
ASTM-D971	Interfacial Tension	mN/m (±6)	36	36	35			
AS1767-2.1	Breakdown Voltage	Avg.kV (±13)	64	65	62			
ASTM-D1524	Visual Examination	-	Clear & Bright	Clear & Bright	Clear & Bright			
ASTM-D924	Power Factor @ 25°C*	% (±0.01)	0.02	0.01	0.02			
ASTM-D924	Power Factor @ 100°C*	% (±0.30)	1.40	1.20	1.30			
	OQIN	-	1500	1500	1500			
Furanic Compo	ounds: ± denotes MU							
ASTM-D5837	5-HMF	PPB (±10)	2	4	6			
ASTM-D5837	2-FAL	PPB (±13)	634	360	482			
ASTM-D5837	2-FOL	PPB (±7)	<5	<5	<5			
ASTM-D5837	2-ACF	PPB (±4)	<8	<8	<8			
ASTM-D5837	5-M2F	PPB (±5)	<3	<3	6			
	Calculated D.P.	-	496	566	530			
	Calculated Remaining Life	%	66	75	70			

Signatory:



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ts (cont.)	Sample Identification: Latest sample taken by TxMonitor/Machinemonito					
	Sample Date	01/Nov/2020	24/Feb/2015	23/Jan/2011		
	Analysis Date	04/Nov/2020	28/Feb/2015	27/Jan/2011		
	Report Date	04/Nov/2020	04/Mar/2015	03/Feb/2011		
	Temp °C *	35	25	31		
	Laboratory	TxMonitor	TxMonitor	TxMonitor		
	Sample ID	TX0003	TX002	TX0001		
± denotes MU						
Paper D.P.*^	-	350	900	875		
PCB*	PPM (±1)	<1	<1	<1		
Specific Gravity*	g/ml	0.89	0.89	0.89		
Resistivity @ 25°C*	Ω-cm (±6.5)	16.00	12.00	15.00		
Resistivity @ 100°C*	Ω-cm (±7.5)	20.00	18.00	15.00		
DBPC*^	%w/w (±0.05)	0.05	0.15	<0.05		
TIC*^	%w/w (±0.05)	0.05	0.15	<0.05		
IC Classification*^	-	Trace inhibited oil	Inhibited oil	Trace inhibited oil		
Silicone Content*^	PPM					
Particles*^	>4µm	600	1200	1500		
Particles*^	>6µm	52	100	132		
Particles*^	>21µm	20	56	85		
Particles*^	>38µm	2	5	12		
Particles*^	>70µm	1	2	<1		
ISO Code*^	-	15/12/8	16/13/10	20/15/12		
Cleanliness Code*^	-	Good	Good	Poor		
	ts (cont.)	ts (cont.) Sample Date Analysis Date Report Date Temp °C * Laboratory Sample ID t denotes MU Paper D.P.*^ PCB* PPM (±1) Specific Gravity* g/ml Resistivity @ 100°C* Q-cm (±7.5) Resistivity @ 100°C* Q-cm (±7.5) Resistivity @ 100°C* Q-cm (±7.5) IC Classification*^ IC Classification*A IC Classification*A PPM Particles*A >4µm Particles*A >6µm Particles*A >6µm Particles*A >21µm Particles*A >38µm	ts (cont.)SampleIs (cont.)Sample Date01/Nov/2020Analysis Date04/Nov/2020Report Date04/Nov/2020Temp °C *35LaboratoryTxMonitorLaboratoryTxMonitorSample IDTX0003Paper D.P.*^-Specific Gravityg/mlSpecific Gravity*g/mlSpecific Gravity*0.cm (±7.5)Resistivity @ 100°C* Ω -cm (±7.5)DBPC*^%w/w (±0.05)MW(±0.05)0.05IC Classification*^-Trace inhibited oil0.05Silicone Content*^PPMParticles*^>4µm600Particles*^Particles*^>21µmISO Code*^-ISO Code*^-ISO Code*^-Good	Sample Identification: L Sample Cont.) Sample Identification: L Sample Date 01/Nov/2020 24/Feb/2015 Analysis Date 04/Nov/2020 04/Mar/2015 Report Date 04/Nov/2020 04/Mar/2015 Image: Laboratory TxMonitor TxMonitor Image: Laboratory TxMonitor TxMonitor Sample ID TX003 TX002 \pm denotes MU Sample ID TX003 TX002 Paper D.P.*^ - 350 900 PCB* PPM (±1) <1	Sample Identification: Latest sample tal Sample Date 01/Nov/2020 24/Feb/2015 23/Jan/2011 Analysis Date 04/Nov/2020 28/Feb/2015 27/Jan/2011 Report Date 04/Nov/2020 04/Mar/2015 03/Feb/2011 Temp °C * 35 25 31 Laboratory TxMonitor TxMonitor TxMonitor Sample ID TX003 TX002 TX001 Paper D.P.*^ - 350 900 875 PGB* PPM (±1) <1	Sample Identification: Latest sample taken by TxMonito Sample Date 01/Nov/2020 24/Feb/2015 23/Jan/2011 Analysis Date 04/Nov/2020 28/Feb/2015 27/Jan/2011 Report Date 04/Nov/2020 04/Mar/2015 03/Feb/2011 Temp *C * 35 25 31 Laboratory TxMonitor TxMonitor TxMonitor Sample ID TX0003 TX002 TX0001 * denotes MU Sample ID TX0003 TX002 TX0001 * denotes MU Sample ID TX003 TX002 TX0001 PBe* PPM (±1) <1

 $({}^{\star})$ Tests marked with this asterisk are not part of the scope of NATA accreditation.

(^) Tests marked with this symbol are performed by a NATA accredited third-party.

N/A Not Applicable



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Corrosive Sulphur per ASTM D1275B* (This section is not part of the scope of NATA accreditation)

Details	Class	Description	Photo
Sample ID: TX0003 Date: 1/11/2020	Non Corrosive	1a - Slight Tarnish Light Orange, almost the same as freshly polished strip	
Sample ID: TX002 Date: 24/02/2015	Corrosive	4c - Corrosion Glossy or Jet Black	
Sample ID: TX0001 Date: 23/01/2011	Non Corrosive	1a - Slight Tarnish Light Orange, almost the same as freshly polished strip	

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Corrosive Sulphur per IEC 62535* (This section is not part of the scope of NATA accreditation)

Details	Class	Paper Description	Copper Description	Photo
Sample ID: TX0003 Date: 1/11/2020	Non Corrosive	No deposits visible	1a - Slight Tarnish Light Orange, almost the same as freshly polished strip	
Sample ID: TX002 Date: 24/02/2015	Non Corrosive	No deposits visible	4a - Corrosion Transparent Black, Dark Gray or Brown with Peacock Green barely showing	
Sample ID: TX0001 Date: 23/01/2011	Potentially Corrosive	No deposits visible	4b - Corrosion Graphite or lusterless Black	

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Corrosive Su	llphur per DIN 51353* (This section is not part of	the scope of NATA accreditation)				
	Details	Class	Photo				
Sample Date	e ID: TX0003 : 1/11/2020	Absent					
Samp Date:	le ID: TX002 24/02/2015	Present					
Sample Date:	e ID: TX0001 23/01/2011	Absent					



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Duval's Triangles DGA Interpretation (This section is not part of the scope of NATA accreditation) [from IEEE (C57-104)]





Triangle 1

Classical Triangle for Mineral Oils

Triangle 4

Low Temperature Faults in Mineral Oils. This triangle is used for a more precise diagnosis of faults identified as low temperature (PD, T1 or T2) by Triangle 1. Do not use for faults D1, D2 or T3.



Triangle 5

Low Temperature Faults in Mineral Oils. This triangle is used for a more precise diagnosis of faults identified as low temperature (PD, T1 or T2) by Triangle 1. Do not use for faults D1 or D2.

Fault Code	Description
PD	Partial Discharge
D1	Discharges of Low Energy
D2	Discharges of High Energy
T1	Thermal Fault (< 300°C)
T2	Thermal Fault (300 - 700°C)
Т3	Thermal Fault (> 700°C)
S	Stray Gassing of Oil (< 200°C)
0	Overheating (< 250°C)
С	Possible Carbonisation of Paper

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External Subcontractors (This section is not part of the scope of NATA accreditation)							
Test	External Provider Accreditation Address						
Particle Count	ticle Count SGS Australia		NATA: 15506		28 Reid Rd., Perth Airport, WA 6105		
Specific Gravity	vity Powerlink Queensland NATA:			NATA: 134	01	33 Harold Street Virginia, 0	QLD 4014
Degree of Polymerization Ventia			IANZ: 4253		Gridco Rd., Gate 2, Otara, Otahuhu 1640, NZ		
Inhibitor Conte (ASTM D2668)	nt - DBPC	SGS Australia		NATA: 155	06	28 Reid Rd., Perth Airport,	WA 6105

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