

WINDING RESISTANCE

Substation:	Orange Bay Substation
Date:	16-Oct-07
Transformer S.N.:	88.2.4020
MVA Rating	25MVA
Manufacturer:	Pauwels
Voltage Rating HV/LV:	69/24kV
Connection	DyN1

Tester	
Ambient Temp	Deg. C
Winding Temp	Deg. C
Humidity	

Item No.	Description	Readings													
		17					9					1			
		Dial Position		I %	Winding Resistance	Unit	Dial Position		I %	Winding Resistance	Unit	Dial Position		I %	Winding Resistance
Ohms	Amps	Ohms	Amps				Ohms	Amps							
1	Tap Position														
2	Wye with Neutral														
2.1	R _Y (R _{AN}) (X1-X0)	200 mΩ	500mA	96.8%	21.0	mΩ									
2.2	R _B (R _{BN}) (X2-X0)	200 mΩ	500mA	96.8%	24.0	mΩ									
2.3	R _C (R _{CN}) (X3-X0)	200 mΩ	500mA	96.8%	24.4	mΩ									
2.4	R _T = R _{AN} + R _{BN} + R _{CN}														
2.5	R _{TC} = R _T * (T _S + T _K) / (T _M + T _K)														
3	Delta														
3.1	R _A (R _{AB})(H1-H3)	200 Ω	500mA	96.5%	2.6	Ω	200 Ω	500mA	96.5%	2.13	Ω	200 Ω	500mA	96.5%	2.6 Ω
3.2	R _B (R _{BC})(H2-H1)	200 Ω	500mA	96.5%	2.6	Ω	200 Ω	500mA	96.5%	2.11	Ω	200 Ω	500mA	96.5%	2.6 Ω
3.3	R _C (R _{CA})(H3-H2)	200 Ω	500mA	96.4%	2.5	Ω	200 Ω	500mA	96.5%	2.13	Ω	200 Ω	500mA	96.5%	2.5 Ω
3.4	R _T = 3/2 * (R _{AB} + R _{BC} + R _{CA})														
3.5	R _{TC} = R _T * (T _S + T _K) / (T _M + T _K)														

T_M Measured temperature (Winding)
 T_S Reference temperature (Temp rise + 30 deg. C.)
 T_K 234.5 (for Cu)

Tested by: David Clarke
 Approved: _____

Date: 16-Oct-07

 Date: _____

INSULATION RESISTANCE

Substation/Location:	Orange Bay Substation
Date:	19-Oct-07
Transformer S.N.:	88.2.4020
MVA Rating	25
Manufacturer:	Pauwels
Voltage Rating HV/LV, kV:	69/24kV

Ambient Temperature:	Deg. C
Winding Temperature	Deg. C
Oil Temperature	Deg. C
Temperature Correction	
Humidity	%

Test Equipment	AVO
Model	Megger BM110

Item No.	Test	Test Volts	Resistance Readings - M Ohms		
			Duration	Measured	Corrected to 20 deg. C
1	Megger - Insulation	5kV	2 Min		
1.1	HV to LV and Ground	5kV	2 Min	762	
1.2	LV to HV and Ground	5kV	2 Min	893	
1.3	HV and LV to Ground	5kV	2 Min	600	
1.4	HV to LV	5kV	3 Min	1500	
2	Core Insulation Res.	500V	2 Min		
2.1	Core ground strap - tank ground	500V	2 Min		

Tested by: **Zone 3 Crew**

Date: **19-Oct-07**

Approved: _____

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Ratio Tests - Turns Ratio Test (TTR) Method

Substation:	Orange Bay Substation	
Date:	16-Oct-07	
Transformer S.N.:	88.2.4020	
MVA Rating	25	MVA
Manufacturer:	Pauwels	
Year of Manufacturer:	1988	
Voltage Rating HV/LV:	69/24	kV

Test	Equipment	Result
Ambient Temperature 35 Deg. C		
Humidity		

Test Method	Equipment	Type/Model

Item No.	Connections	Ratio																
		Tap Positions																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	Voltage	75,900								69,000								62,100
	Design Ratio	5.50								5.00								4.56
1	Delta - Delta (Ddo)																	
1.1	Phase A (H ₁ -Ho:X ₁ -X ₂)																	
1.2	Phase B (H ₂ -Ho:X ₂ -X ₃)																	
1.3	Phase C (H ₃ -Ho:X ₃ -X ₁)																	
1.4	Maximum Variation (%)																	
2	Delta - Star (Dyn1)																	
2.1	Phase A (H ₁ -H ₃ :X ₁ -X _o)	5.5009								5.0005								4.4988
2.2	Phase B (H ₂ -H ₁ :X ₂ -X _o)	5.5012								5.0011								4.4989
2.3	Phase C (H ₃ -H ₂ :X ₃ -X _o)	5.5011								5.0009								4.4989
2.4	Maximum Variation (%)	0.01%								0.01%								0.04%
	Max allowed = 0.5%																	

Notes

1. Perform Null & Unity Ratio checks
2. Check winding polarity
3. Do not change connection until the test set is deenergised

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Manufacturer:	Pauwels
Voltage Rating HV/LV, kV:	69/24kV

Ambient Temperature:	Deg. C
Winding Temperature	Deg. C
Oil Temperature	Deg. C
Temperature Correction	
Humidity	%

Test Equipment	AVO
Model	Megger BM110

Item No.	Test	Test Result Readings			
		Duration		Capacitance	P.I.
1	I.R. Test P.I.	1 Minute	10 Minute		
1.1	HV - LV				1.73
1.2	LV - Ground				1.73
1.3	HV - Ground				1.83
1.4	HV & LV - Ground				1.58
2	Core Insulation Res.	500V	2 Min		
2.1	Core ground strap - tank ground				

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Oil Temperature	Deg. C
Temperature Correction	
Humidity	%

Test Equipment	AVO
Model	Megger BM110

Item No.	Test	Test Result Readings			
		Duration		Capacitance	P.I.
1	I.R. Test P.I.	1 Minute	10 Minute		
1.1	HV - LV	919 MΩ	1.72 GΩ		1.88
1.2	LV - Ground	653 MΩ	1.01 GΩ		1.67
1.3	HV - Ground				
1.4	HV & LV - Ground				
2	Core Insulation Res.	500V	2 Min		
2.1	Core ground strap - tank ground				

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HYDROGEN AND WATER CONTENT & DIELECTRIC STRENGTH

Substation:	Orange Bay
Transformer Manufacturer	Pauwels
Transformer S.N.	88.2.4020
Date:	23-Oct-07
Transformer ID	T1

Oil Temperature (Op. temp.)	
Winding Temperature	
Ambient Temperature:	
Humidity:	

Item No.	Test/Description	Readings	Item No.	Test/Description	Readings
1	Dielectric Strength	kV	3	Water	
1.1	Sample 1	40	3.1	Content, ppm	
1.2	Sample 2	46	3.2	Rel Saturation (@ op. temp.), %	
1.3	Sample 3	49			
1.4	Sample 4	50			
1.5	Sample 5	49			
1.6	Average	47			
2	Hydran	ppm			
2.1	Hydrogen Content, ppm				

Replace oil if acidity exceeds .35mg
 Filter oil if dielectric strength is 25kV or below
 Recommended frequency - annually

Tested by **Zone 3 Crew** Date: **23-Oct-07**

Approved: _____ Date: _____