

## THE CITY OF WINNIPEG

TENDER NO. 152-2023

NEWPCC UV TRANSFORMER ENCLOSURE REPAIR

APPENDIX C

**Transformer Inspection Report** 



# Service Report

- Customer: City of Winnipeg NEWPCC 2230 Main Street Winnipeg, Manitoba R2V 4T8
- Attention: Ryan Norrie
- Subject: UV Transformer Testing and Inspections

Prepared by: Curtis Zary Date: May 6 2021 IER Job #: 39021



May 6, 2021

**City of Winnipeg NEWPCC** 2230 Main Street Winnipeg, Manitoba R2V 4T8

Attention: Ryan Norrie

Subject: UV Transformer Testing and Inspections

IER Job #: 39021

Ryan,

Attached for your records is a brief summary of services performed, deficiencies and recommendations from the UV Transformer Testing and Inspections. Also included are the individual equipment test sheets where additional information can be found.

It was a pleasure working with you and your personnel. If you have any questions or if we can be of further assistance feel free to let us know.

Regards,

Curtis Zary.



#### I. SERVICES PERFORMED

• Isolate UV Transformers to perform inspections, cleaning and testing.

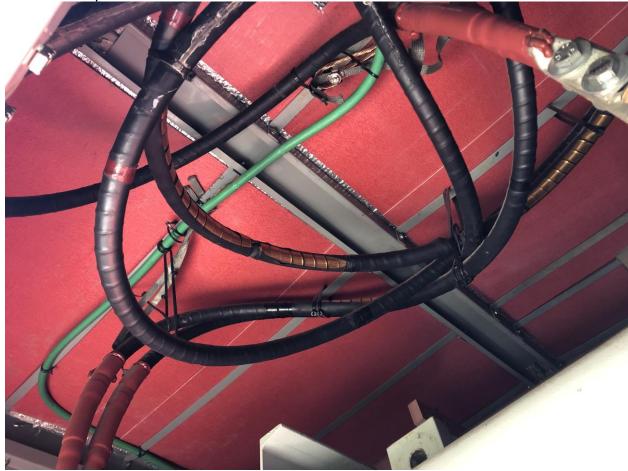
#### II. DEFICIENCIES/RECOMMENDATIONS

- All 4 outdoor 4160V dry type UV transformers have top entry cable and bus duct. That combined with 3 piece poorly designed enclosure roofs have caused water entry and corrosion of the roof tops. IER recommends continued monitoring of transformers.
- UVT-2 Severely corroded enclosure roof.





• UVT-2 4160V primary H1 cable heat shrink has split due to transformer heat. This has exposed the tape shield which was found to be broken in 2 places.





• UVT-3 Corroded Enclosure Roof.





LST-4 Corroded Roof.





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### LST-5 Minor Roof Corrosion.



• IER recommends continued electrical maintenance to ensure system function and reliability.

IER Industrial Electrical Repair Ir	пс.	Dry	v Type Transformer Test Sheet										
Customer:	NEWPCC			021 Date	e: May 5 2021								
Equipment ID:			Tested Bv	:C2	Z/MZ								
		UV			VT-2								
		ANN GE	Phases: 3 Hz: 60										
	RPF-00		BIL-PRI: 60 kV										
		000	BIL-SEC: 10 kV										
	4160		Winding Temp.: n/a °C										
	480/277	-	Tap Setting - Found:   4 to 2   -   8 to 6										
Impedance:		@ 170C		ing - Left:	_								
				nnection:									
Turns Ratio Test (TTR)													
Tap Position:	4&3 to 8&7	4&2 to 8&7	4&2 to 8&6	4&1 to 8&6	4&1 to 8&5								
Primary Voltage:	4368	4264	4160	4056	3952								
Calculated Ratio:			12.008										
H1-H /X -X :			n/a cannot isolate										
Exciting Current [mA]:			n/a										
H2-H/X -X :			n/a										
Exciting Current [mA]: H3-H /X -X :			n/a										
Exciting Current [mA]:			n/a										
		round @ 500VDC [M(Meg)											
Manageral	Hi to Lo and Ground	Lo to Hi and Ground	Hi and Lo to Ground	Core to Ground	7								
Measured Corrected to 20°C		n/a	n/a	n/a	-								
Inspection of Dry Type Tra	ansformer:												
Exte	rior / Interior Condition:	top rusting, i	nside cleaned	_									
Clean	and Inspect Insulators:	clean	ned, ok										
n	Mounting and Supports:	clean	ed, ok										
		clean		_									
	nections for Tightness:		bk	-									
	or Signs of Overheating:		ok	-									
Inspect for Adequa	te Electrical Clearance:		<u>ok</u>										
			n/a										
			/a	-									
		n/a, OX tie		_									
Comments:	Nont, ereanang.			_									
Cleaning and inspection on	to Low and Ground @ 5K ink split exposing tape shi	VDC for 1 minute = 43.1G o	hms. Test includes primary	cables.									

Industrial Electrical Repair In	nc.				Dry	Туре	Tra	nsfor	mer	Test She	et					
Customer:	Job #: 39021 Date: May 5 2021															
Equipment ID:						Te	ested Bv:		CZ	/MZ						
Substation:						UV										
							Phases:		3							
Serial #:		4		BIL-PRI:60kV												
										kV						
-	4160					Winding Temp.:n/a°C										
	480/277										-	8	to 6			
Impedance:		7.48%	@ 170C													
							BIL-PRI: 60 kV   BIL-SEC: 10 kV   Winding Temp.: n/a °C   Tap Setting - Found: 4 to 2 - 8 to 6   Tap Setting - Left: - - -   Transformer Connection: Delta / Wye - -   &2 to 8&6 4&1 to 8&5   4160 4056 3952 - -   12.008 - - - -   n/a - - - - -   n/a - - - - -									
Turns Ratio Test (TTR)																
Tap Position:	4&3 to	8&7	4&2	to	8&7	4&2	to	8&6	4&1	to 8&6	4&1	to	8&5			
Primary Voltage:	4368			4264			4160		4056		3952					
Calculated Ratio:						12.008										
H1-H/X -X :						n/a (	cannot is	olate								
Exciting Current [mA]:						n/a										
H2-H /X -X :						n/a										
Exciting Current [mA]:						n/a										
НЗ-Н /Х -Х :							n/a									
Exciting Current [mA]:																
Insulation resistance Test	: @ 1000VDC, Co	ore to Gr	ound @	500VDC	C [M(Meg)	G(Gig) T(	Tera) Ol	hms]								
Hi to Lo and Ground			Lo to	Hi and (	Ground	Hi and	l Lo to C	Ground	Core	e to Ground	-					
Measured	n/a		n/a			n/a				n/a	-					
Corrected to 20°C																
Inspection of Dry Type Tra	ansformer:															
Exte	rior / Interior Co	ndition:		top	o rusting, ir	side clea	ned.									
	and Inspect Ins					ed, ok			_							
N	Nounting and Su	pports:			clean	ed, ok			_							
	Iron and	d Coils:			clean	ed, ok			_							
				ok												
	or Signs of Overl															
Inspect for Adequa						ok										
					n/a											
Ventilation Filters: Fans:						n/a										
		n/a, OX tied		d.		_										
Comments:	-				-	~			-							
Cleaning and inspection onl Insulation Resistance High t **Top of transformer enclos	to Low and Grour								cables.							

IER Industrial Electrical Repair I	nc.	Dry Type Transformer Test Sheet													
Customer:	NEWPCC		Job #:	_	390	021	Date:	N	lay 5 20:	21					
Equipment ID:			Te	sted Bv:		C7/M7									
		UV		Feeder: LST-4											
		NN					Phases		3						
		GE		· · · · · · · · · · · · · · · · · · ·											
	RPF-00	03-170063								kV					
kVA:	1	250		_			BIL-SEC	: 10		kV					
	4160			Winding Temp.:n/a °C											
	600/347	V @ 1700							-	8	to 6				
Impedance:	7.14%	@ 170C		-				SIL-PRI: <u>60</u> kV IL-SEC: <u>10</u> kV							
				T	ransfo	rmer Co	nnection	Date: May 5 2021   CZ/MZ LST-4   asses: 3   Hz: 60   L-PRI: 60   KV   -SEC: 10   rate: -   May 5 2021   LST-4							
Turns Ratio Test (TTR)															
Tap Position:	4&3 to 8&7	4&2 to	8&7	4&2	to	8&6	4&1	to 8&6	4&1	to	8&5				
Primary Voltage:	4368	426	4		4160			4056		3952					
Calculated Ratio:					12.008										
H1-H /X -X :					12.005										
Exciting Current [mA]:					52.6										
H2-H /X -X :				12.008											
Exciting Current [mA]: H3-H /X -X :					45.6										
Exciting Current [mA]:					12.008 57										
Insulation resistance Tes		ound @ 500V[	DC [M(Mea)	G(Gia) T(T		msl									
	Hi to Lo and Ground	Lo to Hi and	d Ground	Hi and		round	Cor	e to Ground							
Measured		120			73.2G	lound									
Corrected to 20°C		-													
Inspection of Dry Type T	ransformer:								_						
Exte	erior / Interior Condition:	top	rusting, insi	de dirty, cle	aned										
	and Inspect Insulators:			ied, ok			_								
	Mounting and Supports:		clean	ied, ok			_								
	Iron and Coils:		clean	ied, ok			_								
	Check All Connections for Tightness: of						_								
Inspect for	ok														
Inspect for Adequa	ok			_											
	/a			_											
	1/a			_											
	i/a d to ground			_											
Comments:	NGR / Grounding:			a to ground			-								
Comments: Secondary disconnected for	or testing.														
Insulation Resistance High **Top of transformer enclor	to Low and Ground @ 5K	VDC for 1 minu	te = 40.4G o	hms. Test i	ncludes	primary	cables.								

IER Industrial Electrical Repair In	Type Transformer Test Sheet														
Customer:		N	IEWPCC				Job #	:	390	021		Date:	M	ay 5 20	21
Equipment ID:						T		Τe	sted By:			CZ/	/MZ		
Substation:				UV		i	1	Tested By:   CZ/MZ     Feeder:   LST-5							
			<i>[</i>	ANN			┨────	Phases: 3							
Manufacturer:				GE			<u> </u>								
Serial #:			RPH-00	01-171016	<u> </u>	!	1					60		_	I
						!	4			BIL-SEC				_	ļ
				-		ļ		-		ng Temp.				_°C	-
SEC: Impedance:		600/347		_ <b>V</b> @ 170C		P	Tap Setting - Found:   4 to 2   -   8 to 6							to 6	
inpoduite:							Tap Setting - Left: – Transformer Connection: Delta / Wye								
Turns Ratio Test (TTR)								Ifansie	mer oo.	Inecuci.	: <u></u>		Jeila / vvj	/e	
Turns Railo reactions					<del></del>			<u> </u>			<u> </u>			<del></del>	
Tap Position:	4&3	to	8&7	4&2	to	8&2	4&2	to	8&6	4&1	to	8&6	4&1	to	8&5
Primary Voltage:		4368		<b> </b>	4264	I	<u> </u>	4160		<b></b>	4056			3952	
Calculated Ratio:			I	<b> </b>				12.008		<b> </b>			ļ		
H1-H /X -X :			I	<b> </b>		!	+	12.003		<u> </u>					
Exciting Current [mA]:			l	<b> </b>		!	+	38		<u> </u>					
H2-H /X -X :							+	12.005 31.5							
Exciting Current [mA]: H3-H /X -X :							12.004								
Exciting Current [mA]:							+	38.1		<u> </u>					
Insulation resistance Test		NDC. C	ore to G	round @ {	SOUADC	` M(Meg)	G(Gia) T(		omel	<u> </u>					
						[									
		Lo and G		Lo to H		Ground	Hi and	Lo to G	round	Cor	e to Gro	ound	1		
Measured		146G	I	───	219G			95.8G			12.7G				
Corrected to 20°C				<u> </u>			<u> </u>						]		
Inspection of Dry Type Tra	ansforme	er:													
Exte	erior / Inte	erior Co	ondition:			clean	ied, ok			_					l
Clean	and Insp	pect Ins	ulators:			clean	aned, ok								
η	Nounting	ງ and Sເ	upports:				ied, ok			-					
							ied, ok			-					
	-						ok			-					
							ok			-					
Inspect for Adequa										-					
							n/a			-					
							1/a 1/a			-					
	NGR / Grounding:n/a, OX tied									-					
Comments:							<u> </u>			-					
Secondary disconnected fo Insulation Resistance High **Top of transformer enclos	to Low ar	ind Groui		VDC for 1	minute	= 47.8G of	hms. Test	includes	sprimary	cables.					