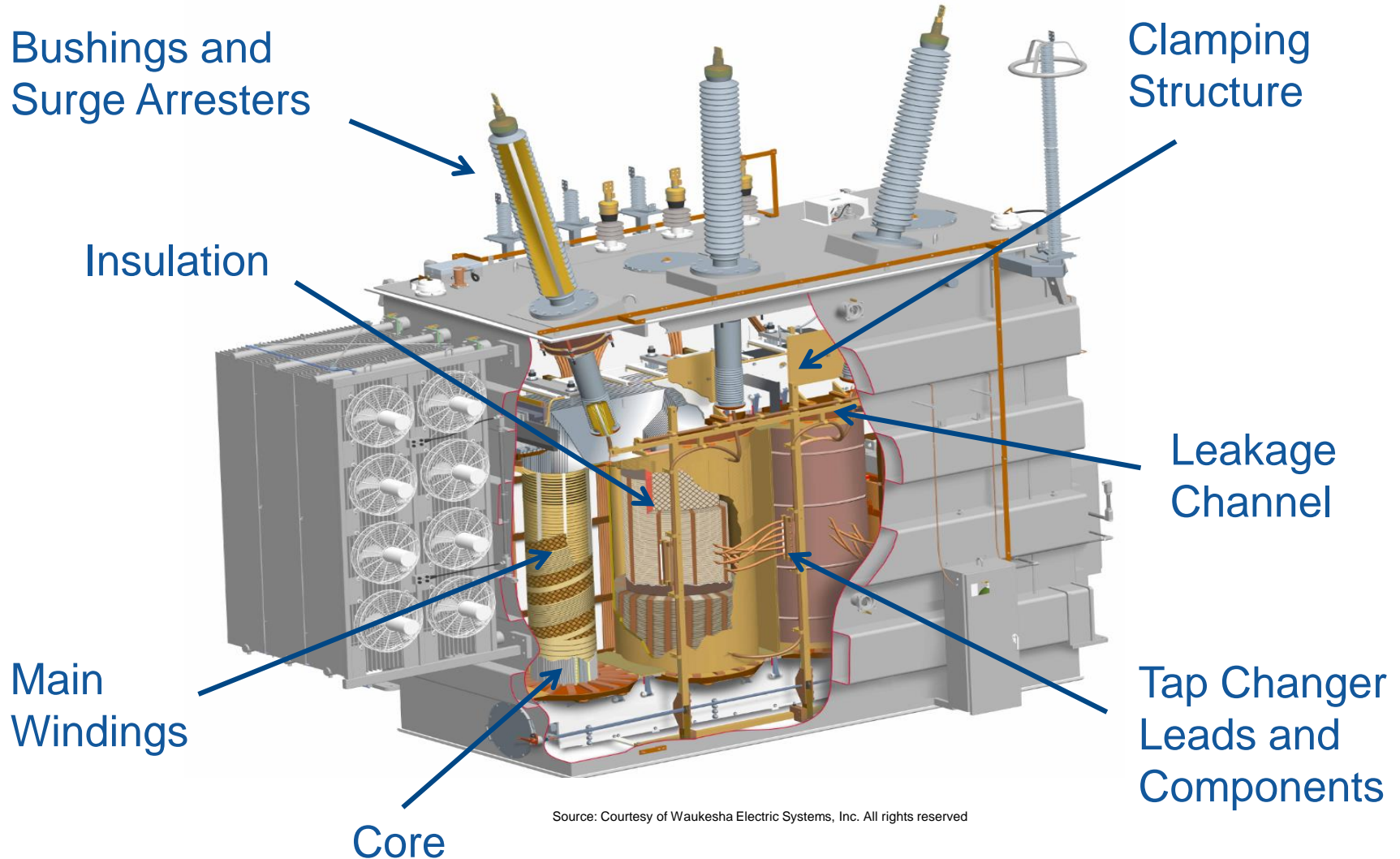




A Guided Workflow Approach to Transformer Diagnostic Testing

Power Transformer Component Overview



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Power Transformer Diagnostic Overview

Dielectric

DGA

Oil Screen

PF & CAP

Exciting Ima

Turns Ratio Tests

DFR

Insulation Resistance

Partial Discharge

Thermal

DGA

Oil Screen

IR

DC Winding RES

Mechanical

SFRA

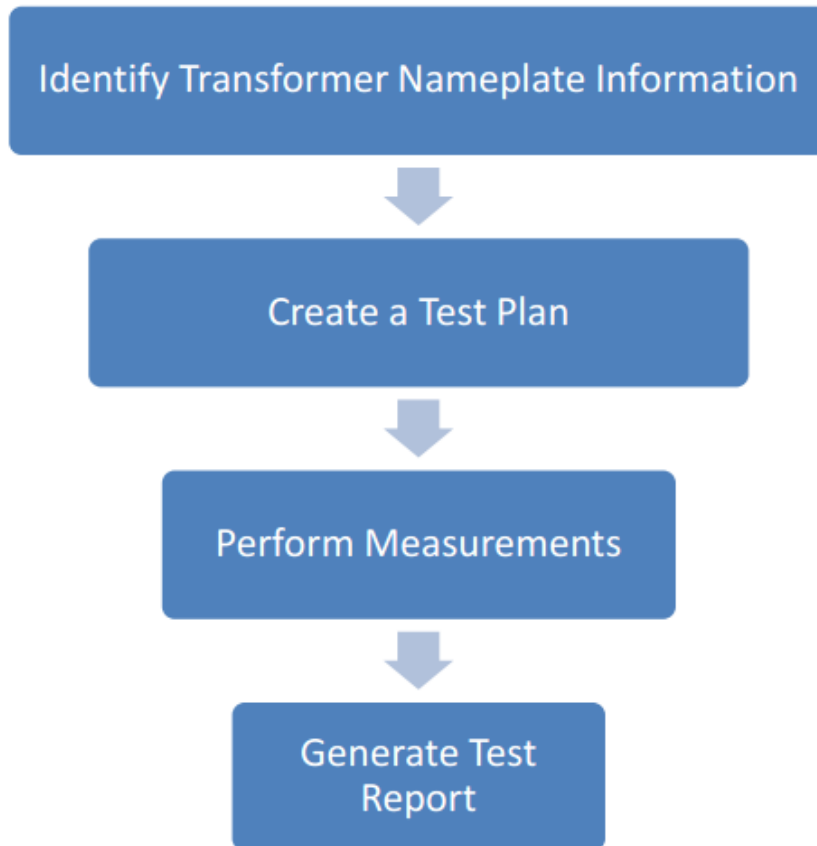
Leakage Reactance

PF & CAP

Exciting Ima

DC Winding RES

Workflow Process



Start

Finish



Workflow Requirements

Identify Transformer Nameplate Information

Minimum Required Input:

- *Location/Substation Name
- *Time and Date
- *Work Order
- *Serial Number
- *Asset Type (2-Winding, 3-Winding, Auto, etc...)

Test Plan Generation

Create a Test Plan

Job *
2016-03-15 Job 1
Status: Prepared

Overview

Location
Waltham

Asset
Two-winding
saoijsaoijsa

Tests

- Oil Analysis
- Overall PF & CAP
- Bushing H PF & CAP - C1
- Bushing H PF & CAP - C2
- Bushing X – Energized Collar
- Surge Arrester Watt Losses H
- Exciting Current
- Leakage Reactance H-X
- TTR H-X
- SFRA Test
- DC Winding Resistance H

Report

Available tests

CPC CIBANO 500 FRANE0 800

Available guided tests

- Bushing H PF & CAP - C2
- Bushing H – Energized Collar
- Bushing X PF & CAP**
- Bushing X – Energized Collar
- Exciting Current**
- Exciting Current
- Surge Arrester Watt Losses**
- Surge Arrester Watt Losses H
- Insulating Fluids PF & CAP**
- Insulating Fluids PF & CAP
- Leakage Reactance**
- Leakage Reactance H-X
- Zero Sequence Impedance**
- Zero Sequence Impedance X
- TTR**
- TTR H-X
- DC Winding Resistance**
- DC Winding Resistance H
- DC Winding Resistance X
- Demagnetization**
- Demagnetization

Available manual tests

- TanDelta - CP TD1

Selected tests

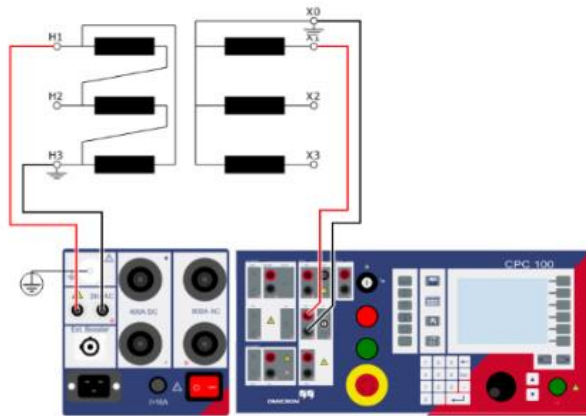
Add from file

Selected tests

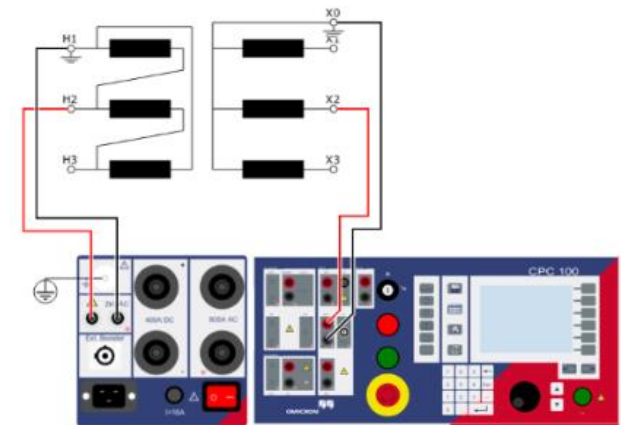
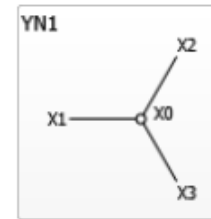
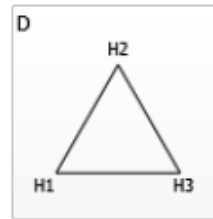
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CPC	<input checked="" type="radio"/>	Overall PF & CAP	X
CPC	<input checked="" type="radio"/>	Bushing H PF & CAP - C1	X
CPC	<input checked="" type="radio"/>	Bushing H PF & CAP - C2	X
CPC	<input checked="" type="radio"/>	Bushing X – Energized Collar	X
CPC	<input checked="" type="radio"/>	Surge Arrester Watt Losses H	X
CPC	<input checked="" type="radio"/>	Exciting Current	X
CPC	<input checked="" type="radio"/>	Leakage Reactance H-X	X
CPC	<input checked="" type="radio"/>	TTR H-X	X
FRANE0 800	<input checked="" type="radio"/>	SFRA Test	X
CPC	<input checked="" type="radio"/>	DC Winding Resistance H	X
CPC	<input checked="" type="radio"/>	DC Winding Resistance X	X
CPC	<input checked="" type="radio"/>	Demagnetization	X

Execute Test (TTR)

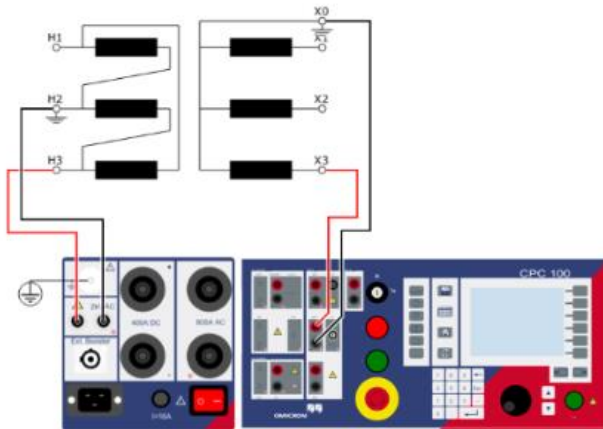
Perform Measurements



Phase A

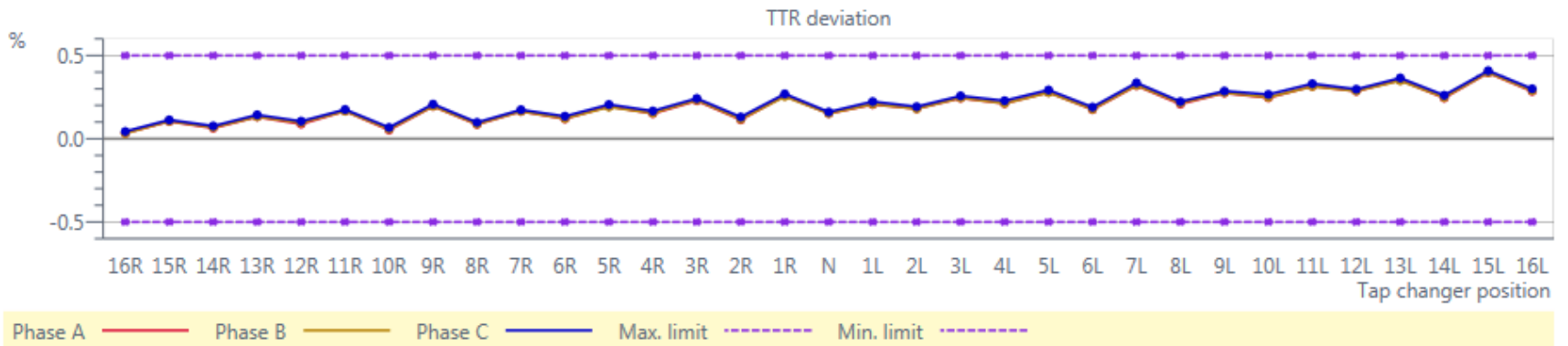
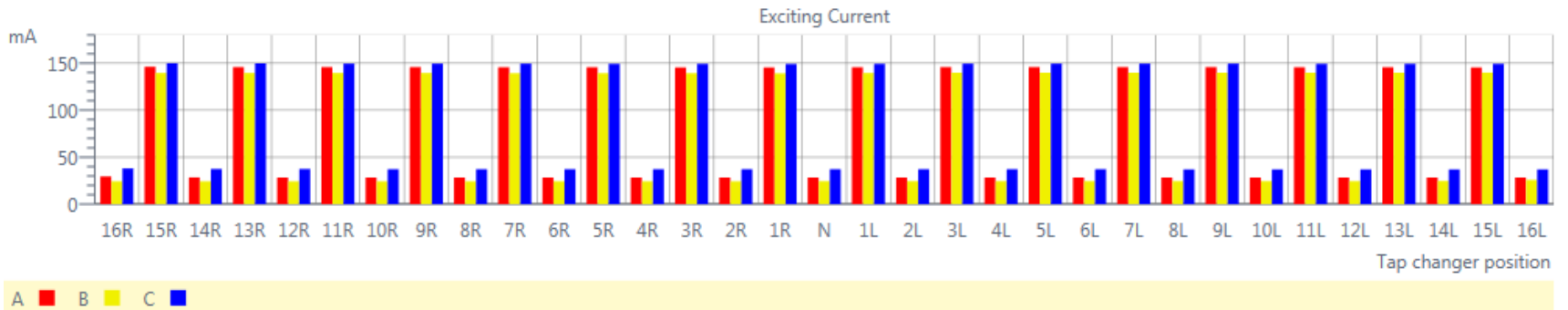
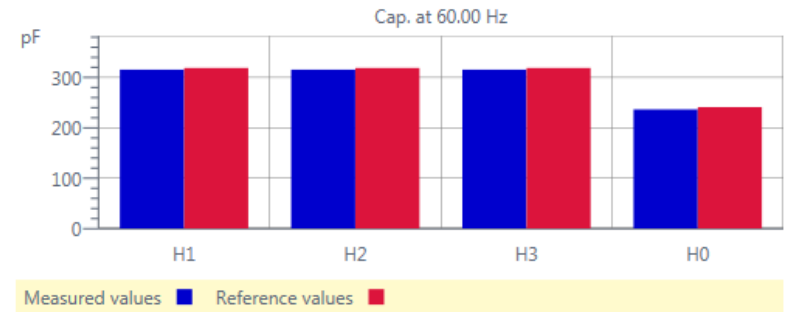
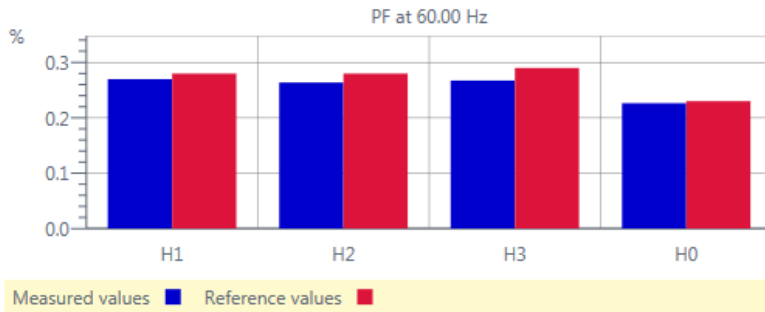


Phase B



Phase C

Analyze Results



Generate Report

Generate Test Report

Overall PF & CAP			
Ambient temperature	28 °C	Weather	Clear
Top oil temperature	27 °C	Humidity	%

Block 1: injection at H

Corr. temperature	27 °C									
Corr. factor	0.85									
* Reference voltage	10.0 kV									
No.	Meas.	Test mode	Freq.	V out	* I out	* Watt losses	PF meas	PF corr	Cap. meas	Assessment
1	ICH+ICHL	GSTg-B	60.00 Hz	10.00 kV	29.80 mA	583.42 mW	0.1958 %	0.1664 %	7901.3 pF	Pass
2a	ICH (V)	GSTg-A+B	60.00 Hz	10.00 kV	10.93 mA	315.65 mW	0.2888 %	0.2455 %	2895.9 pF	Pass
3a	ICHL (V)	UST-A	60.00 Hz	10.00 kV	18.87 mA	264.60 mW	0.1402 %	0.1192 %	5005.4 pF	Pass
Cross check: calculated ICHL					18.87 mA	267.77 mW	0.1419 %		5005.5 pF	Pass









Block 2: injection at X

Corr. temperature	27 °C									
Corr. factor	0.85									
* Reference voltage	10.0 kV									
No.	Meas.	Test mode	Freq.	V out	* I out	* Watt losses	PF meas	PF corr	Cap. meas	Assessment
4	ICL+ICLT	GSTg-A	60.00 Hz	7.01 kV	57.20 mA	1262.87 mW	0.2208 %	0.1877 %	15169.1 pF	Pass
5a	ICL (V)	GSTg-A+B	60.00 Hz	7.02 kV	25.14 mA	717.59 mW	0.2854 %	0.2426 %	6666.9 pF	Pass
6a	ICLT (V)	UST-B	60.00 Hz	7.01 kV	32.05 mA	562.93 mW	0.1756 %	0.1493 %	8503.2 pF	Pass
Cross check: calculated ICLT					32.06 mA	545.28 mW	0.1701 %		8502.3 pF	Pass

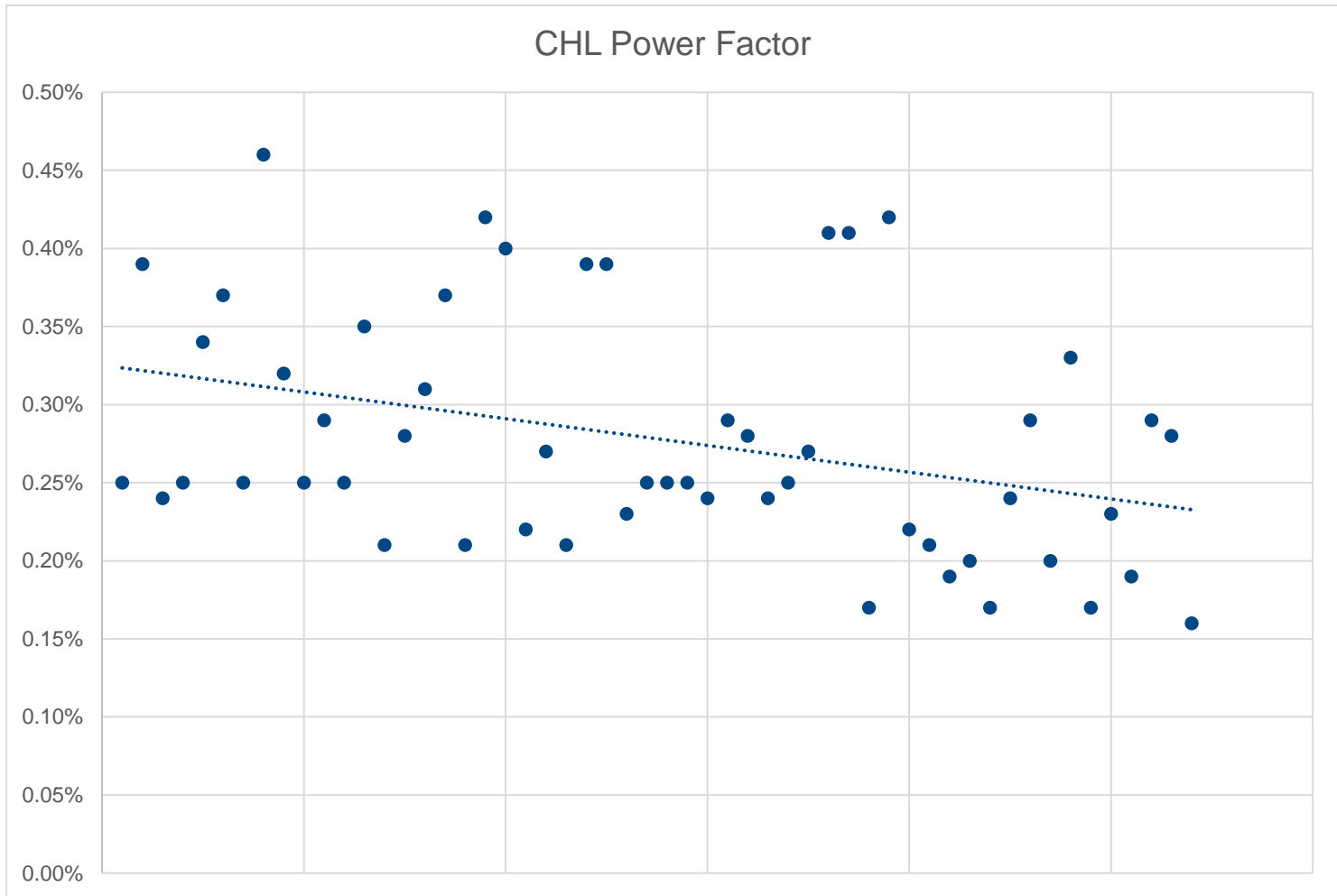
Block 3: injection at Y

Corr. temperature	27 °C									
Corr. factor	0.85									
* Reference voltage	10.0 kV									
No.	Meas.	Test mode	Freq.	V out	* I out	* Watt losses	PF meas	PF corr	Cap. meas	Assessment
7	ICT+ICTH	GSTg-A	60.00 Hz	4.01 kV	42.66 mA	832.86 mW	0.1953 %	0.1660 %	11311.4 pF	Pass
8a	ICT (V)	GSTg-A+B	60.00 Hz	4.01 kV	42.29 mA	826.97 mW	0.1955 %	0.1662 %	11215.9 pF	Pass
9a	ICTH (V)	UST-B	60.00 Hz	4.02 kV	0.36 mA	4.33 mW	0.1204 %	0.1023 %	95.5 pF	Pass
Cross check: calculated ICTH					0.36 mA	5.90 mW	0.1627 %		95.6 pF	Pass

Manage Data

 Location	 Asset	 Job	 Report																																																																																																																																																																																																																																																												
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Job 1</td><td>2014-09-11</td></tr> <tr><td>140400</td><td>2014-08-19</td></tr> <tr><td>140255</td><td>2014-06-16</td></tr> <tr><td>3/14/2014 Job 2</td><td>2014-05-28</td></tr> <tr><td>5/8/2014 Job 1</td><td>2014-05-08</td></tr> <tr><td>4/1/2014 Job 1</td><td>2014-04-01</td></tr> <tr><td>130575</td><td>2014-03-27</td></tr> </tbody> </table>	Name/WO	Creation date	All		2016-03-15 Job 1	2016-03-14	9485-GSU	2016-03-06	SBC903	2016-02-23	1501929	2015-05-04	4/15/2015 Job 1	2015-04-15	3/31/2015 Job 2	2015-03-31	3/31/2015 Job 1	2015-03-31	140778	2015-01-22	1/6/2015 Job 1	2015-01-06	01/02/2015	2015-01-02	130536	2014-12-16	130534	2014-12-10	12/9/2014 Job 2	2014-12-09	130535	2014-12-03	11/29/2014 Job 2	2014-11-29	140637	2014-11-20	140636	2014-11-19	140547	2014-11-05	9/11/2014 Job 2	2014-09-11	9/11/2014 Job 1	2014-09-11	140400	2014-08-19	140255	2014-06-16	3/14/2014 Job 2	2014-05-28	5/8/2014 Job 1	2014-05-08	4/1/2014 Job 1	2014-04-01	130575	2014-03-27	<table border="1"> <thead> <tr> <th>Name</th> 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Thank you for your time!