ANALYSIS OF FACTORS AFFECTING THE RELIABILITY OF REFURBISHED TRANSFORMERS AT KESC TRANSFORMER WORKSHOP

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1. Abstract

Karachi Electric Supply Company (KESC) has transformers of different make like Siemens, Transpak, Pel, Climax etc. This workshop has the capability to carry out the major repair and maintenance of the refurbished transformer. The reliability of transformers has not been ensuring in the maintenance process which cause the repetitive failure at the time of final testing and decrease the performance of the transformer. The objective of this research thesis is to find out the factors inherent in the repair & maintenance process which cause to decrease the quality and reliability of the repaired transformers and give suggestions to enhance the quality of the repair & maintenance processes and reliability of the refurbished transformers as per industry standards.

In this report data related to repair and maintenance of refurbished transformer for the 05 months (April 12 to August 12) has been collected and analyzed by using different quality tools like; Process capability analysis, Pareto analysis, Ishikawa diagram and 5 Why's analysis. On the basis of analysis various factors has been identified which causes to increase failures of refurbished transformers at final stage. In the end of this research thesis, suggestions are given through which number of failures of refurbished transformers at the time of final testing can be reduced to a minimum level.

2. Introduction

Karachi Electric Supply Company (KESC) is the only vertically integrated power utility in Pakistan which currently provides electricity to over 2.1 million consumers, not only in Karachi but also in different towns of the province of Sindh and Baluchistan [3]. At present, it manages the generation, transmission and distribution of electricity. It generates electricity through thermal power plants, Gas turbines and transmitted as alternating current through overhead power lines. Distribution is the final stage in the delivery of electricity to end users. It carries electricity from the grid station and delivers it to the customer through power lines, substations and pole-mounted transformers. Transformers are an integral part of power systems, and their reliability directly affects the reliability of the whole network.

Karachi Electric Supply Company (KESC) has transformers of different companies like Siemens, Transpak, Pel, Climax etc. It has the ability to carry out the major repair and maintenance of the refurbished transformer in their transformer workshop. In last few years KESC faced a problem of repeated failure of transformer. Hence the reliability of the refurbished transformers has been decreasing with increase in failure rates. The objective of this research thesis is to find out the factors which cause to decrease the quality and reliability of the transformers.

The study in this research thesis considered power transformers for utility applications. The first step in evaluation and improvement of the reliability is to find out the causes of failure and to determine transformer outage. Transformer outages are either forced or scheduled. Both types are caused by switching operations. Forced outages of transformers are mainly due to automatic switching operations performed by protection systems [1–2]. They are caused by either external causes (such as transmission line faults) or internal causes (such as core failure and winding failure). In this report we discussed about the internal causes for transformer failures.

2.1 Problem Description

It has been observed by the quality assurance department of KESC that the number of repaired transformers failed at the time of final testing during repair and maintenance process. These repetitive failures of transformers causes extra cost to KESC and also decrease the number of transformer repaired per month.

2.2 Process Layout

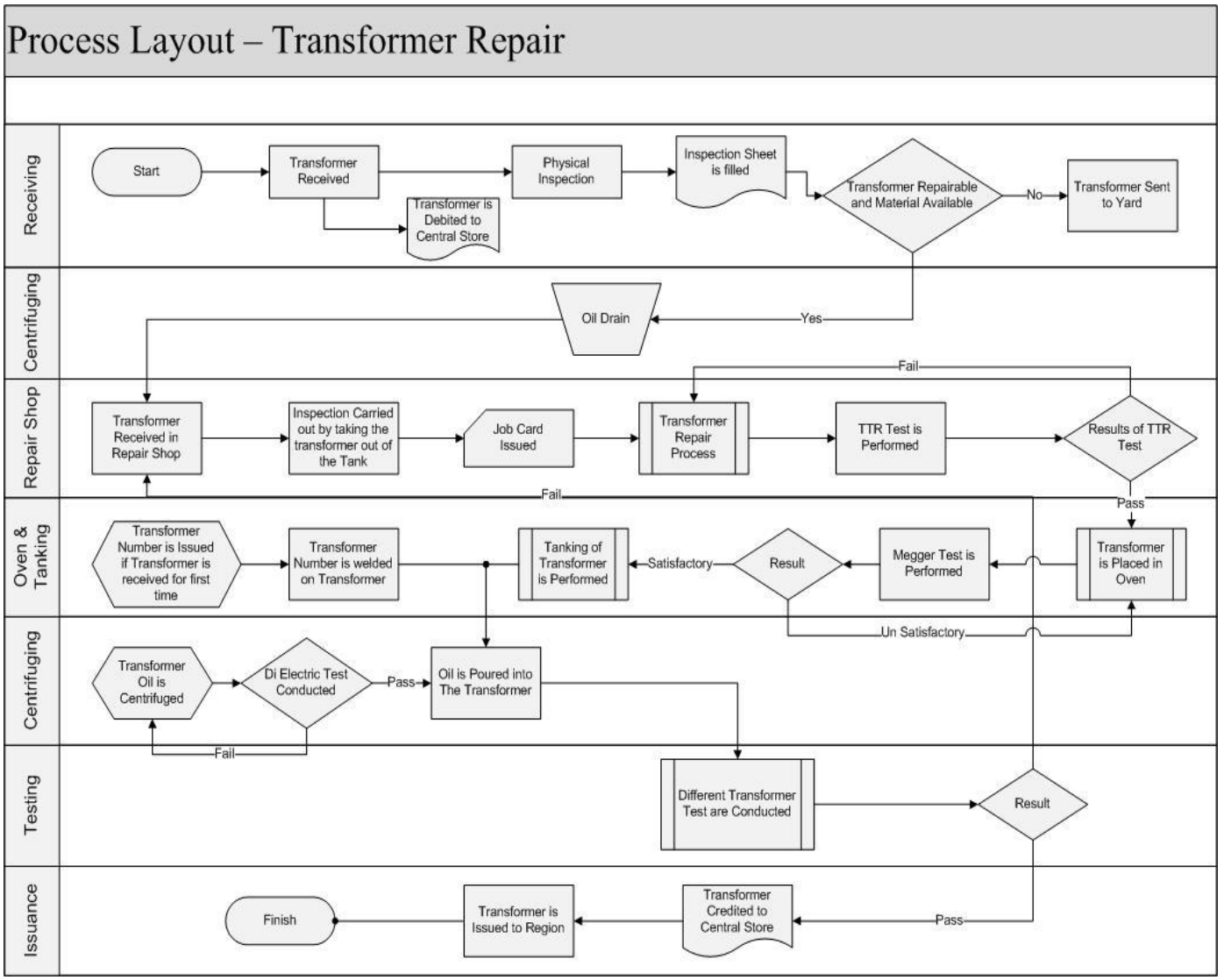


Figure 1: Process Flow Diagram

2.3 Process Description

The stages of the transformer repair process are as follows:

Receiving:

At this stage the faulty transformer is received in the workshop from central store.

Physical Inspection:

It is carried out to check the external condition/ damages of transformer. Additionally, Transformer Turns Ratio (TTR) test is performed to check the internal condition of the transformer. If the transformer is repairable then it is sent to the repair shop otherwise it is sent to the yard.

Dismantling:

Here all the mounted accessories and equipments detached from the transformer and the core coil assembly is taken out from the tank. Job card is issued when all the data and detail of fault is gathered about the transformer.

Transformer Repair Process:

Different processes carried out in the transformer repair shop are shown in the diagram below;

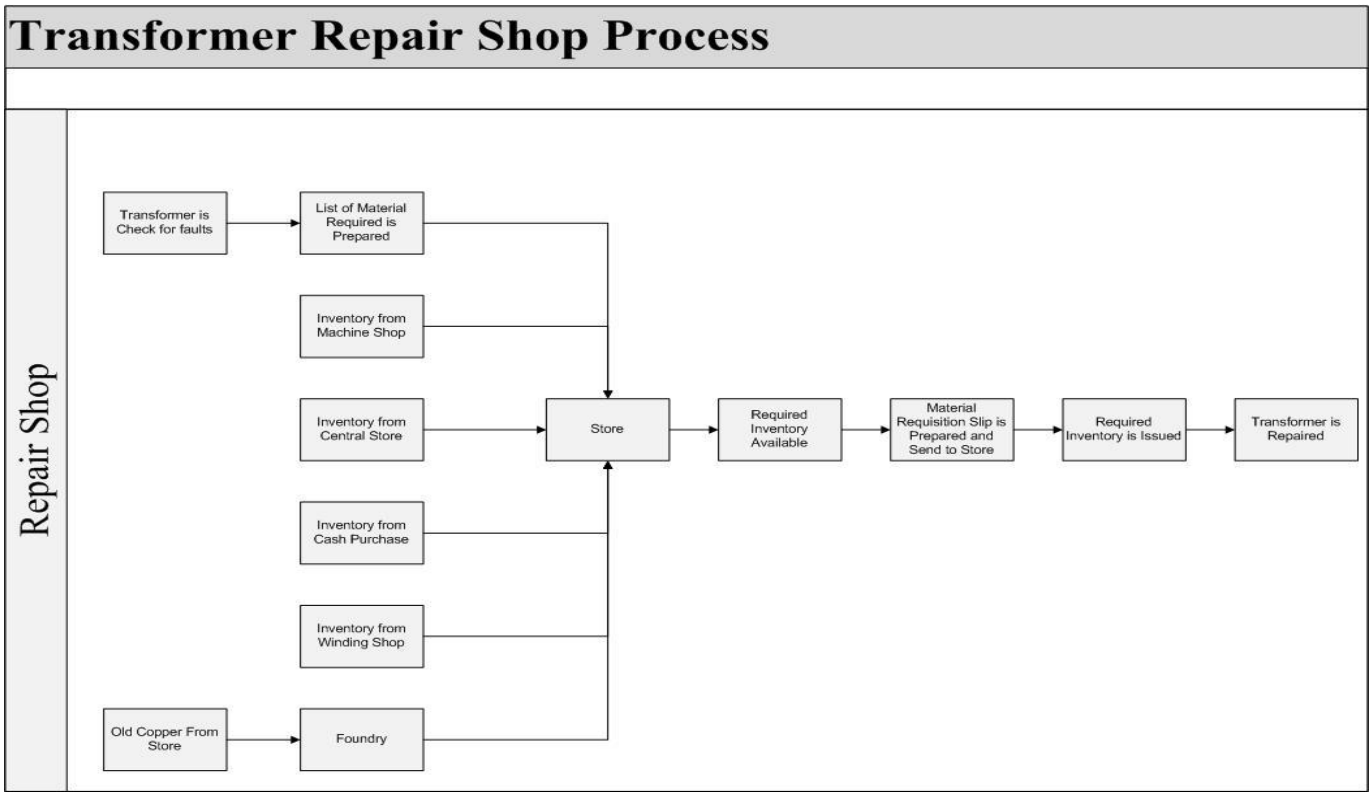


Figure 2: Transformer Repair Shop Process

Centrifuging:

The transformer oil is centrifuged and the dielectric test is performed to check the dielectric strength of the oil.

Oven & Tanking:

Here transformer is placed in drying oven at a temperature of 80 ^{0}C to eradicate the moist from the core coil assembly. Simultaneously, transformer tank be completely cleaned and washed with kerosene oil and afterward filled with new oil prior to assembling.

Final testing:

Insulation resistance test, Winding resistance test, Turns ratio test (TTR) and other tests are performed to assess the condition of repaired transformer. Transformers failed to pass the tests they sent back to repair shop and the whole repair and maintenance process performed again on transformers and if they passed all the tests they are credited to central store.

Issuance:

At last stage the repaired transformers credited to central store from where they issued to different regions of Karachi.

3. Literature Review

Many researchers carried out study on methods to improve the reliability of transformer, few are appended below:-

- A power transformer can fail from any combination of electrical, mechanical or thermal factors. While it is difficult to define a typical failure mode for a transformer due to its complexity, most actual failures involve the breakdown of the transformer's insulation system. Therefore, although the actual cause of the failure of transformer may be electrical, the insulation breakdown precipitating the failure may have resulted from electrical, mechanical or thermal factors. A transformer failure may have more than one casual factor.

  An electrically induced factor results in damage to a transformer's insulation system. Mechanical factor involve deformation of a transformer winding, resulting in rupturing of its insulation. While thermal induced factors involve degradation of insulation system due to normal heating generated in the transformer. (Transformer Failure Analysis, William H. Bartley P.E (2009).

- Hongzhi Ding, Richard Heywood, John Lapworth and Simon Ryder (2009) discussed the common failure modes of large power transformers. Most transformer failures can be classified into either one or a combination of more than one of the following modes:
  - Breakdown of insulation as a whole, due to severe solid insulation ageing;
  - Breakdown of insulation by part, due to premature ageing by localized high temperature overheating;
  - Mechanical failure of windings.

- Dan Zhu (2007) has done research on the Electric Distribution Reliability. The factors influencing power system reliability can be broken down into four categories. They are component reliability, environmental conditions, loading, and system configuration. The availability of component functionally is characterized by failure rates and repair or replacement times. He uses a new approach to systems analysis, Graph Trace Analysis (GTA), to determine the reliability and reconfiguration for restoration calculations. It takes into account multiple concurrent failures and load priorities. It is shown that reconfiguration for restoration improves system reliability by reducing customer down times following power outages. [4]

- Panida Jirutitijaroen and Chanan Singh (2004) develop a probabilistic model to discuss the effects of transformer maintenance parameters on reliability and cost. According to the transformer maintenance model the deterioration process of transformer is divided into three stages D1, D2 and D3. The sensitivity analysis of inspection rate of each stage is implemented on the model through MATLAB software. This analysis covers mean time to the first failure (MTTFF), maintenance cost, inspection cost, and failure cost. The simulation results are presented as under:
  - Inspection rate of D1 helps extending MTTFF; however, too high inspection rate of D1 might reduce MTTFF. In addition, inspection rate of D2 beyond a certain value has a minimal impact on reliability. Transformer life-time will be longer with improved inspection rate of D3.
  - Cost effective maintenance occurs at small inspection rate of D1 and high inspection rate of D2 and D3. [5]

- M. Sefidgaran, M. Mirzaie and A. Ebrahimzadeh (2010) have obtained a reliability model for power transformer with ONAN (Oil Natural Air Natural) cooling by using the Markov process representation and frequency/ duration approach. In this research paper, the transformer is categorized into two sub-systems. Markov models have been applied for modeling the two sub-systems of the transformer. By combining these two sub-systems, the three-state Markov model of the power transformer is achieved. This 3-states model can be used to calculate the probability, frequency and duration of the states. In order to evaluate numerical values of the model parameters and the impact of different components on the reliability of the model, a numerical analysis and sensitivity analysis are presented. Sensitive analysis shows that winding and tap-changer have significant effect on the probability and frequency indices of a power transformer. [6]

- M. Abdelfatah, M. EL-Shimy and H.M. Ismail (2011) have done the reliability analysis of 220 kV power transformers in Egypt. In this paper outage-data analysis is considered. Several indices are determined for evaluating the reliability of power transformers. The determined indices are the average annual number of failures (AANF), average annual

interrupted MW (AAIMW), average annual repair time (AART), average annual customer interruption duration (AACID), failure rate, availability, and maintainability. In the 220 kV transformers, the largest AANF was caused by over current protection due to heavy loads. This indicates that the number of 220 kV transformers is insufficient to supply the present loads. Meanwhile the largest values of AAIMW were associated with Human mistakes. Most of the mistakes occur during the maintenance of disconnected transformer or equipment. The longest AACID occurred due to outages that include human mistakes, breakdown and damage. Buchholz and pres-sure relief relays contributed in the large values of AART. [7]

- Barron J. Bichon, John M. McFarland and Sankaran Mahadevan (2011) have done the computational reliability analysis to assess the safety or reliability of an engineered system by considering how its performance is affected by random variations and uncertainties. The objective of their research is to compute an estimate of the probability that the performance of the system will satisfy a given requirement or conversely, the probability that the system will fail. This paper presented the application of the efficient global reliability analysis (EGRA) method to system-level reliability analysis. Three formulations (named: Component solutions, Composite Gaussian process model and Composite expected feasibility function) for applying EGRA to this class of problems were explored, but Composite EFF was identified as the best option. This formulation uses independent Gaussian process models for each of the component response functions, and selects the training data for these models based on a search for the composite limit state. At each new training point selected by EGRA, only the response functions for which this point is expected to improve the approximation of its component limit state are evaluated, i.e., all component response functions are not necessarily evaluated at all points. By focusing the GP training data (points at which the true response functions are evaluated) near only the portions of the component limit states that bound the system failure region, locally accurate models can be built with very few samples. This makes EGRA a highly efficient method for performing system-level reliability analysis. [8]

- Dietrich W presented an international survey (1968 to 1978) on failures in large power transformers in service. It has been found that, in general, the failure rate of a transformer is about 2% per unit-year. In this paper, failures have been categorized by failed components, failure origins and failure causes of autotransformers, power station and substation transformers.

4. Transformer Tests

Following are the different tests performed on the transformer at the final stage of testing;

a. Measurement of Winding Resistance.
b. Insulation Resistance Test.
c. Transformer Turn Ratio Test (TTR).
d. Impedance Test.
e. Dielectric Strength of Transformer Oil.
f. No – Load Loss Test.
g. Load Loss Test.
h. Induced Voltage Test.
i. High Voltage Test.

4.1 Measurement of winding resistance

Winding resistance measurement test is used to check transformer windings, terminal connections and both to use as reference for other tests and to calculate the load loss values at reference temperature. This test can also be used to detect faulty joints or tap switch contacts within the windings. Measuring the winding resistance is done by using DC current and is dependent on temperature. The resistance value can be calculated by the equation below:

$$R_2 = R_1 \text{ x } (235 + t_2)/ (235 + t1) \qquad \text{(for copper)}$$

R2: winding resistance at temperature t2,
R1: winding resistance at temperature t1

Winding resistances are measured between all connection terminals of windings and at all tap positions. During this, winding temperature should also be appropriately measured and recorded.
The measuring current can be obtained either from a battery or from a constant (stable) current source. The measuring current value should be high enough to obtain a correct and precise measurement and small enough not to change the winding temperature.

Measuring circuit and performing the measurement

In this method the measuring current passing through the winding also passes through a standard resistor with a known value and the voltage drop values on both resistors (winding resistance and standard resistance) are compared to find the unknown resistance (winding resistance). One should be careful not to keep the voltage measuring voltmeter connected to the circuit to protect it from high voltages which may occur during switching the current circuit on and off.

CONNECTION SCHEME:

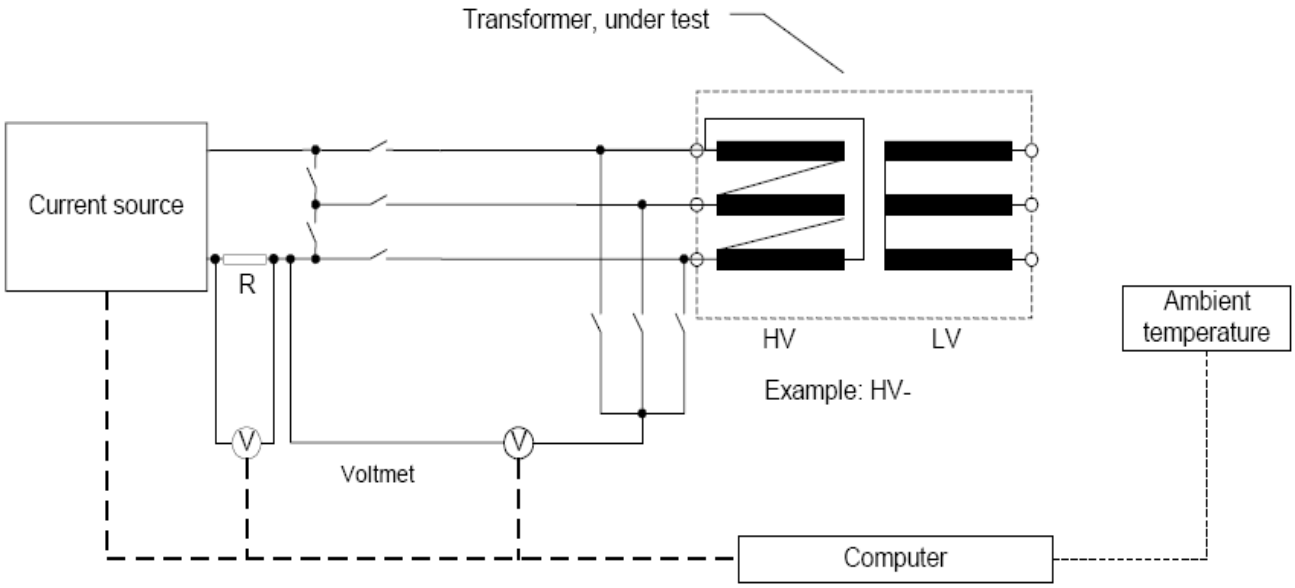


Figure 3: Measuring the resistance by Current-Voltage method

4.2 Insulation Resistance Test

Insulation resistance (IR) test is performed to determine the insulation conditions of the transformer's windings to earth and between windings. It is usually performed to obtain three different winding insulation resistances: high voltage to ground (HT-E); low voltage to ground (LT-E); and high voltage to low voltage (HT-LT).

If the transformer has more than two windings, the insulation resistance of each winding is measured in turn with the other windings grounded. These insulation resistances are measured with a DC insulation resistance tester i.e. a mega-ohmmeter. The test equipment is suitably sized for the transformer or winding to be tested and the test performed at a voltage level consistent with the voltage rating of the winding under test.

The temperature of the winding is measured at the same time as the insulation resistance value is obtained, which will allow the resistance reading to be corrected to a common temperature such as 20^0C. Test voltages are applied for one minute. All accessories attached to the winding are disconnected and grounded to the core. Recommended minimum insulation resistance values may be obtained from the manufacturer's operation manual. In absence of this information typical minimum values are shown below. If resistances values are obtained that are below these values, one should investigate to determine the cause of the low values. The significance of one insulation resistance reading is not well defined for liquid-filled or dry-type transformers; consequently, these values are best used to determine equipment suitability for overvoltage tests or for trending over time.

The pass / fail criteria used in the KESC transformer workshop for insulation resistance (IR) test is given below:

For High Temperature windings – Earth (HT - E) = 220 MΩ
For High Temperature windings – Low Temperature windings (HT - LT) = 220 MΩ
For Low Temperature windings – Earth (LT - E) = 150 MΩ

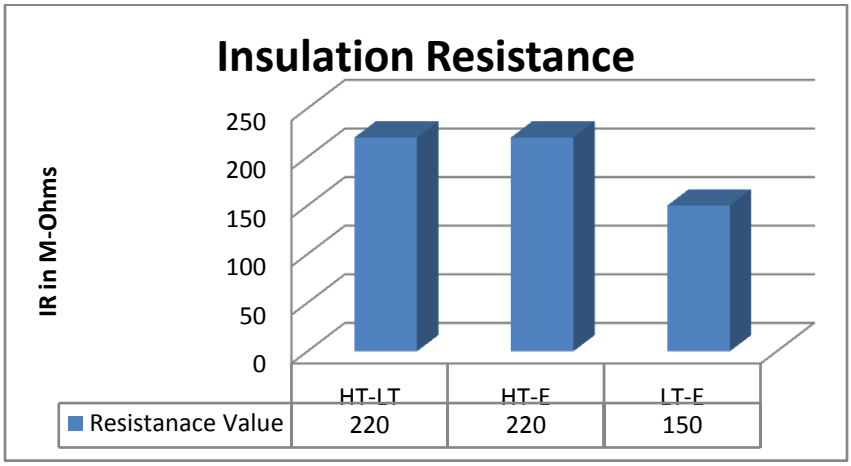


Figure 4: Insulation Resistance

4.3 Transformer Turn Ratio Test (TTR)

The no-load voltage ratio between two windings of a transformer is called turn ratio. Transformer Turn Ratio (TTR) test is performed to confirm the no-load voltage ratio, determining the conditions of both the windings and the connections and examining the problems.

To perform this test, low-voltage AC is applied to the low-voltage winding of the transformer, and the voltage induced in the high-voltage winding is measured through null meter. Using the TTR test set one can determine the polarity of the transformer, phase relations, and turns ratio. Measurements are taken on all tap positions. Unsatisfactory results can be an indication of loose connections, tap changer misalignment, short circuits, incorrect turns after rewind, or open circuits in the winding. The maximum variation of the measured value of the turn's ratio with respect to the calculated value is 0.5 percent.

Theoretical turn ratio = HV winding voltage / LV winding voltage

Common TTR responses and the associated transformer condition are:

TTR READING	CONDITION
Low current and no output volts	Open turn in the excited winding
Normal current, output voltage low or unstable	Open turn in output winding
High current and difficulty balancing the bridge	High resistance in test leads or tap changer

4.4 Impedance Test

The impedance of a transformer is the total opposition offered an alternating current. This test provides a practical method of measuring the equivalent impedance of a transformer without separating the impedance of the windings.

As the transformer ages or suffers events such as through faults, nearby lightning strikes, and other surges, this test is used in the field to detect winding deformation. Winding deformation can lead to immediate transformer failure after a severe through fault, or a small deformation can lead to a failure years later.

In order to determine equivalent impedance, one winding of the transformer is short circuited, and just enough voltage is applied to the other winding to create full load current to flow in the short circuited winding. This voltage is known as the impedance voltage. Either winding may be short-circuited for this test, but it is usually more convenient to short circuit the low-voltage winding. The transformer impedance value is given on the nameplate in percent.

This means that the voltage drop due to the impedance is expressed as a percent of rated voltage. For example, if a 2,400/240-volt transformer has a measured impedance voltage of 72 volts on the high voltage windings, its impedance (Z), expressed as a percent, is:

$$\% Z = (\text{Impedance voltage} / \text{High Voltage}) \times 100$$

The pass / fail criteria used in the KESC transformer workshop for % Impedance test is given below:

KESC = 4.0 – 5.5
WAPDA = 3.6 – 4.4

4.5 Dielectric Strength of Transformer Oil

Dielectric strength test measures the voltage where the oil electrically breaks down. It is also known as Breakdown Voltage (BDV) of transformer oil. This test gives a good indication of the amount of contaminants (water and oxidation particles) in the oil. Break down voltage is measured by observing at what voltage, sparking starts between two electrodes immerged in the oil, separated by specific gap. Low value of BDV indicates presence of moisture content and conducting substances in the oil.

For measuring BDV of transformer oil, portable BDV measuring kit is used. In this kit, oil is kept in a pot in which one pair of electrodes are fixed with a gap of 2.5 mm (in some kit it 4mm) between them. Now slowly rising voltage is applied between the electrodes. Rate of rise of voltage is generally controlled at 2KV/s and observe the voltage at which sparking starts between the electrodes.

That means at which voltage Dielectric Strength of transformer oil between the electrodes has been broken down. Generally this measurement is taken 3 to 6 times in same sample of oil and the average value of these reading is taken. BDV is important and popular test of transformer oil, as it is primary indication of health of oil and it can be easily carried out at site.

Dry and clean oil gives BDV results, better than the oil with moisture content and other conducting impurities. Minimum **Breakdown Voltage of transformer oil** or **Dielectric Strength of transformer oil** at which this oil can safely be used in transformer, is considered as 30 KV.

4.6 No – Load Loss Test

On new transformers this test is performed to verify the core losses or iron losses. On transformers that have been or are about to be repaired the test is usually performed to determine whether there are shorts between laminations and to provide a reference for future tests. The test can be performed using one wattmeter on a single-phase transformer and one, two or three wattmeters on a three-phase transformer. The LV winding is energized to rated voltage with the HV winding open circuit. The watts measured are the no-load losses, and the current is the excitation current. It is important that the supply waveform be sinusoidal and at the correct frequency. The losses are measured with a wattmeter suitable for use at low power factor. Unfortunately, without knowing the original losses it may be difficult to assess the condition of the core in a used transformer.

4.7 Load Loss test

This test is carried out to determine the losses within a transformer due to the resistance of the HV and LV windings. The energizing source should have balanced voltages, and the waveform should be sinusoidal. If these two criteria are met, the measurement can then easily be made with one, two or three wattmeters. The usual method is to short circuit the LV winding and energizes the HV winding on the 100% tap until rated current is achieved. The watts measured are the load losses, and the voltage required to circulate the rated current is the impedance voltage. The winding temperature should also be recorded at this time. The reference temperature used for determining copper losses is 85^0C. The recorded readings will contain core losses as well as the load or copper losses. The core losses can usually be neglected unless the impedance of the transformer is unusually high. In the latter case, the core losses can be measured at the exciting voltage used to obtain the copper losses and subtracted from the value initially recorded. It is also important in this test to ensure that the method used to short circuit the LV winding does not appreciably change the resistance of the LV circuit; otherwise, the measured losses will be affected. The conductors used to make the short circuit connection should have a current carrying capacity equal to or greater than that the corresponding transformer leads.

Permissible Iron and Copper Losses

For Outdoor / Indoor Distribution Transformers 10, 15, 25, 50, 100, 150, 200, 250, 400, 500, 630, 750 & 1000 KVA ratings, the limits of Copper and Iron Losses shall be as follows: -

Table-I

Rating in KVA	Iron Losses (Watts.)	Copper Losses (Watts.)	Total Losses
10 KVA	65 Watts.	320 Watts.	385 Watts.
15 KVA	85 Watts.	435 Watts.	520 Watts.
25 KVA	123 Watts.	640 Watts.	763 Watts.
*50 KVA	175 Watts.	1,170 Watts.	1,345 Watts.
100 KVA	310 Watts.	2,020 Watts.	2,330 Watts.
150 KVA	380 Watts.	2,000 Watts.	2,380 Watts.
200 KVA	495 Watts.	3,410 Watts.	3,905 Watts.
250 KVA	600 Watts.	3,500 Watts.	4,100 Watts.
400 KVA	925 Watts.	5,600 Watts.	6,525 Watts.
500 KVA	935 Watts.	5,715 Watts.	6,650 Watts.
630 KVA	1,350 Watts.	8,150 Watts.	9,500 Watts.
750 KVA	1,250 Watts.	7,250 Watts.	8,500 Watts.
1000 KVA	1,500 Watts.	10,000 Watts.	11,500 Watts.
1500 KVA	2,250 Watts.	14,500 Watts.	16,750 Watts.

*These losses are as per WAPDA specification for 50 KVA transformer and these transformers are being procured as per WAPDA specification.

Maximum of 15% tolerance is allowed on individual Iron & Copper Losses being repaired transformer, however all efforts should be made to limit the total losses to 10% over and above the specified value listed above (table-I).

4.8 Induced Voltage Test

The principal purpose of this test is to verify the dielectric strength of turn to turn, layer to layer, phase to phase, and other insulation structures within the transformer windings by inducing an overvoltage condition (at higher than normal frequency to avoid saturation of the core). The test current is monitored, and if it exceeds limits specified for each transformer, the unit is rejected.

The test voltage shall be twice the value corresponding to the rated voltage; it shall be applied between the terminals of the secondary windings, by maintaining the primary winding open. The duration of the test at full voltage shall be 60 s, and the frequency twice the rated value. The test shall start with a voltage lower than 1/3 the full test voltage, and it shall be quickly increased up to full value. At the end of the test, the voltage shall be rapidly reduced up to 1/3 the rated value before disconnection. The test is successful if no failure occurs at full test voltage.

CONNECTION SCHEME:

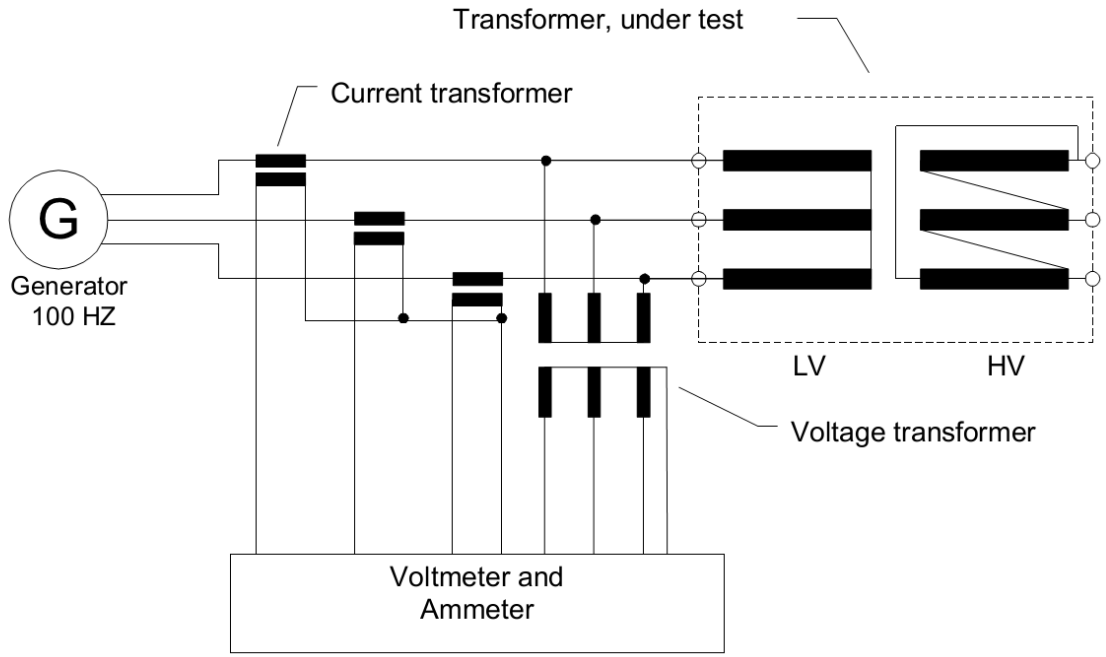


Figure 5: Induced Voltage Test

4.9 High Voltage Test

High voltage test is performed to confirm that a particular transformer or accessory can withstand the electrical stresses in service. This test can be performed using AC or DC. For transformers rated above 34 kV, the DC test should not be used. The electrical stress is usually applied between the windings and ground. The HV and LV windings are usually tested separately with the winding not being tested connected to ground.

The test is performed at rated frequency. At the end of the test, the test voltage be rapidly reduced up to 1/3 the full voltage before disconnection. The full test voltage shall be applied for 60 seconds between the winding under test and all the remaining windings, magnetic core, frame and enclosure connected to earth. The test shall be performed on all the windings. The test is successful if no failure occurs at full test voltage.

CONNECTION SCHEME:

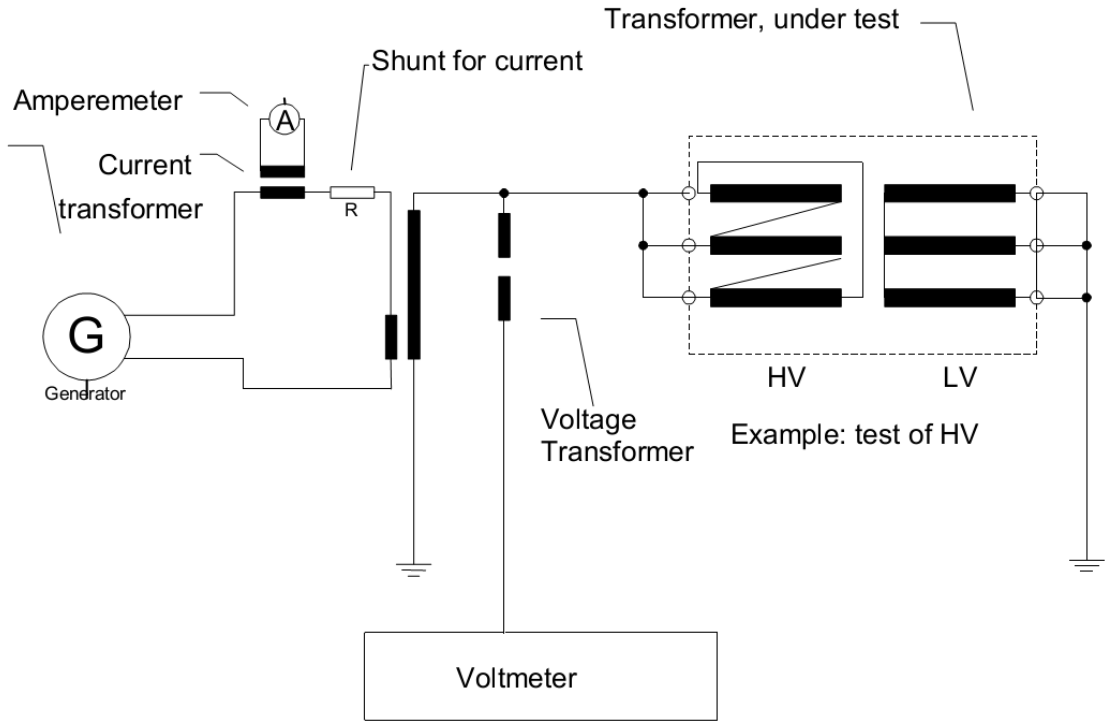


Figure 6: High Voltage Test

5. Data Collection

Data collection is used in the evaluation of present status of the Key Point Index (KPI) which is to be evaluated and improved during project.

5.1 Data Collection Form

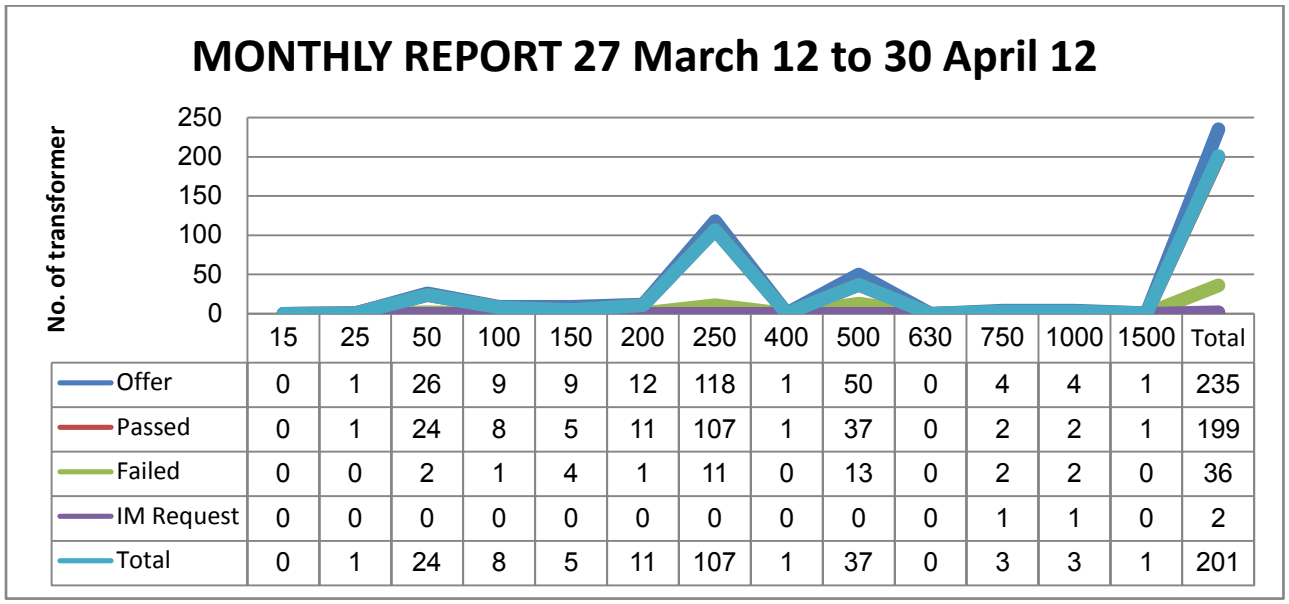
Data of repaired transformers has been collected for the five months from April 2012 to August 2012 on daily basis on the data collection form. The template of data collection form is shown below;

S. No	Date of Inspection	Make	Rating (KVA)	TSW Sr No.	Refurbished earlier by TSW	IR Test (HT-E=220, HT-LT=220, LT-E=150) MΩ	% Impedance WAPDA 3.6 - 4.4 & KESC 4 - 5.5	Losses ≤ 15% for 250kV A & 20% for others	Dielectric Strength ≥ 30 kV	Cond of Oil New /Old	Physical Discrepancy	Inspection result

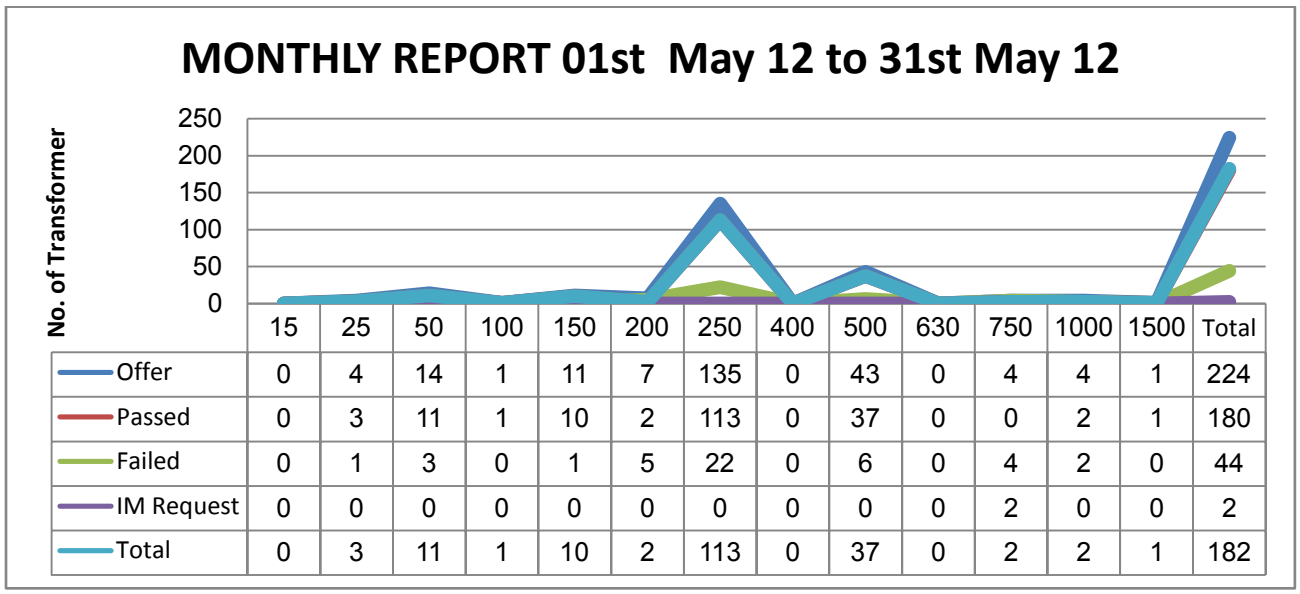
Figure 7: Data Collection Form

5.2 Month wise data collection

Data collected from April 12 to August 12 on the data collection form is shown in appendix 'A'. However a short description is shown in the graph below;

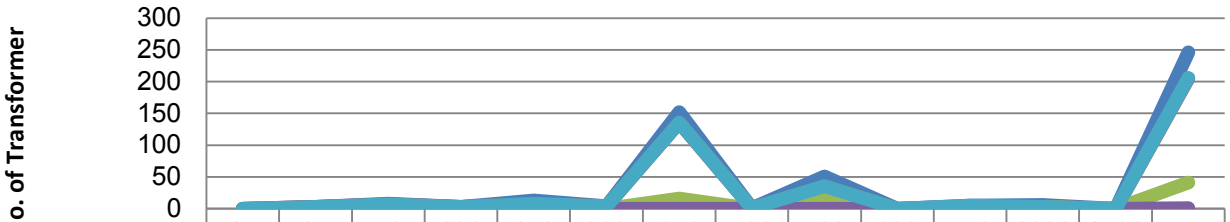


	15	25	50	100	150	200	250	400	500	630	750	1000	1500	Total
Offer	0	1	26	9	9	12	118	1	50	0	4	4	1	235
Passed	0	1	24	8	5	11	107	1	37	0	2	2	1	199
Failed	0	0	2	1	4	1	11	0	13	0	2	2	0	36
IM Request	0	0	0	0	0	0	0	0	0	0	1	1	0	2
Total	0	1	24	8	5	11	107	1	37	0	3	3	1	201



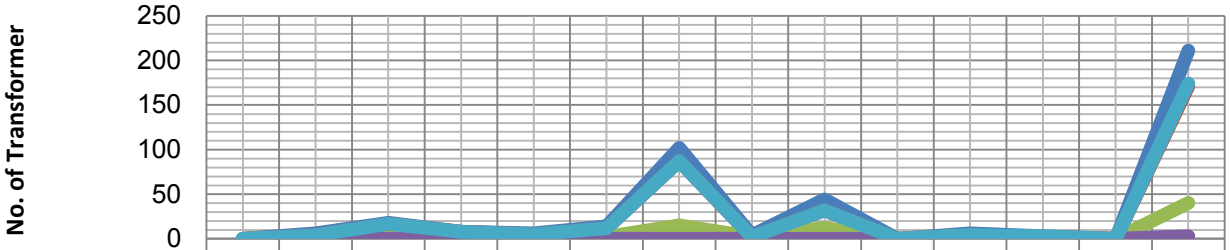
	15	25	50	100	150	200	250	400	500	630	750	1000	1500	Total
Offer	0	4	14	1	11	7	135	0	43	0	4	4	1	224
Passed	0	3	11	1	10	2	113	0	37	0	0	2	1	180
Failed	0	1	3	0	1	5	22	0	6	0	4	2	0	44
IM Request	0	0	0	0	0	0	0	0	0	0	2	0	0	2
Total	0	3	11	1	10	2	113	0	37	0	2	2	1	182

MONTHLY REPORT 01st June 12 to 30th June 12

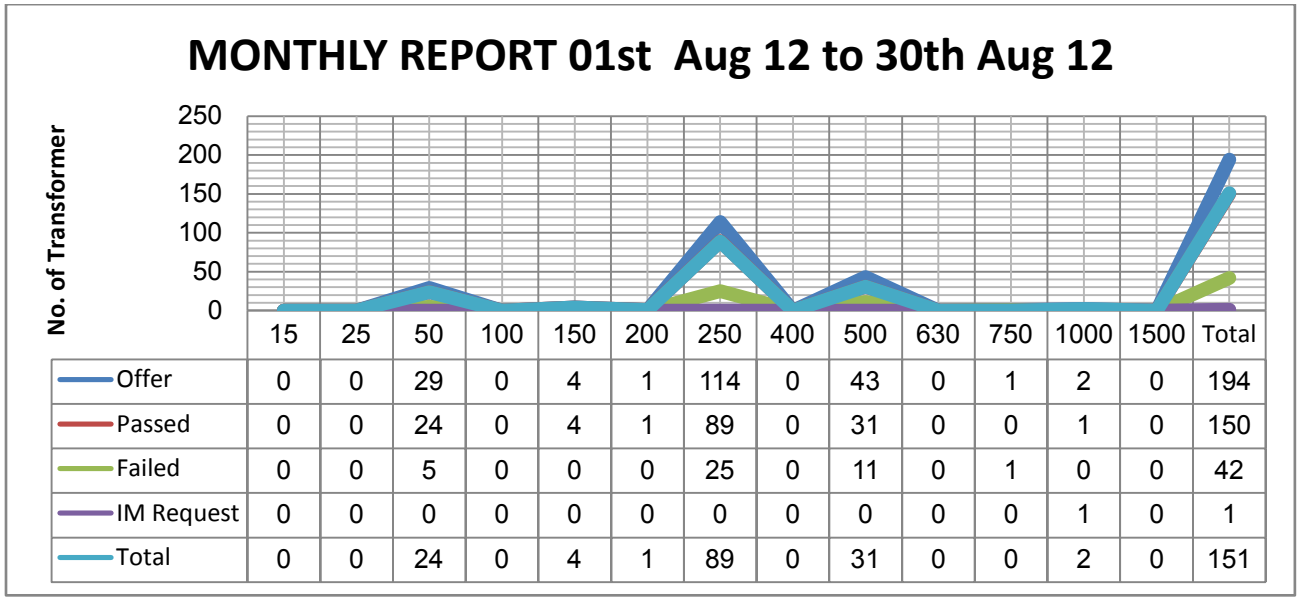


	15	25	50	100	150	200	250	400	500	630	750	1000	1500	Total
Offer	0	3	8	3	13	4	152	1	51	0	5	6	0	246
Passed	0	3	7	3	8	4	136	1	36	0	4	3	0	205
Failed	0	0	1	0	5	0	16	0	15	0	1	3	0	41
IM Request	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	0	3	7	3	8	4	136	1	36	0	5	3	0	206

MONTHLY REPORT 01st July 12 to 30th July 12



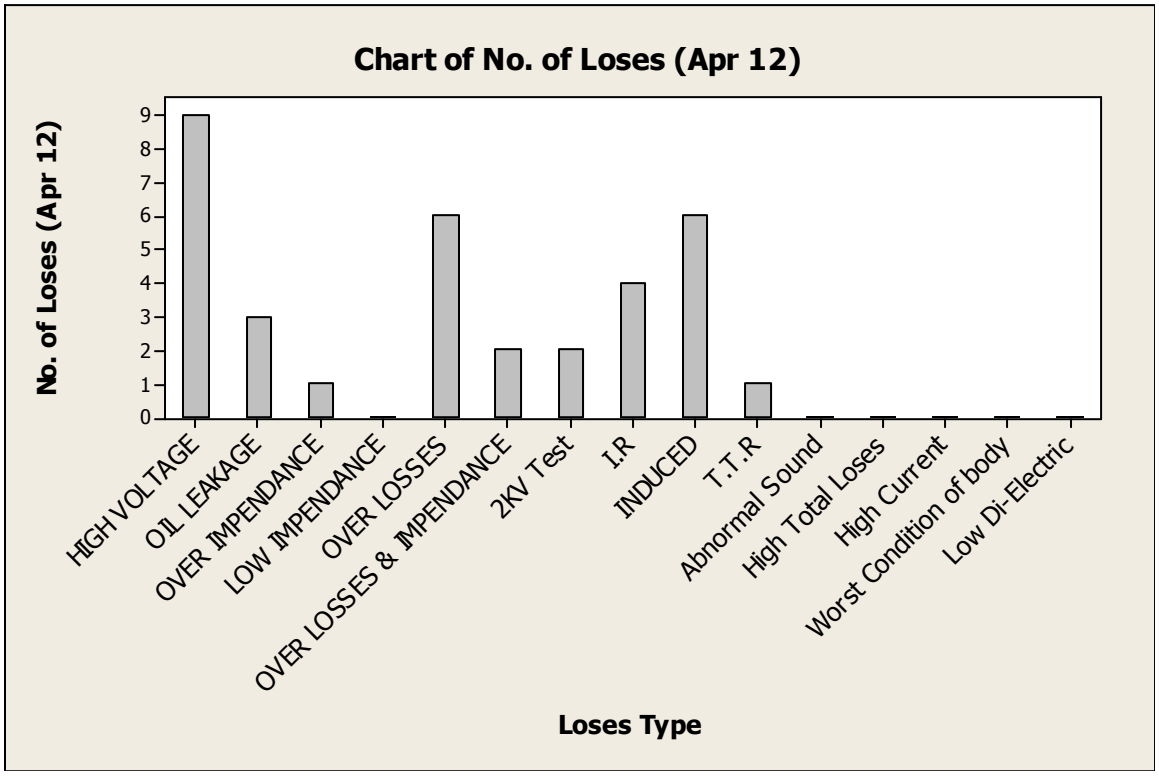
	15	25	50	100	150	200	250	400	500	630	750	1000	1500	Total
Offer	0	6	18	8	6	14	102	4	44	0	6	3	0	211
Passed	0	4	17	8	5	12	87	2	32	0	2	2	0	171
Failed	0	2	1	0	1	2	15	2	12	0	4	1	0	40
IM Request	0	0	0	0	0	0	0	0	0	0	2	1	0	3
Total	0	4	17	8	5	12	87	2	32	0	4	3	0	174



	15	25	50	100	150	200	250	400	500	630	750	1000	1500	Total
Offer	0	0	29	0	4	1	114	0	43	0	1	2	0	194
Passed	0	0	24	0	4	1	89	0	31	0	0	1	0	150
Failed	0	0	5	0	0	0	25	0	11	0	1	0	0	42
IM Request	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total	0	0	24	0	4	1	89	0	31	0	0	2	0	151

6. Analysis of Data

Data of each month has been analyzed with respect to the failure of transformer at the final testing stage. A graph between No. of Loses in transformer and Losses type has been generated through collected data by Minitab Software v16. Graph for the each month has shown below;



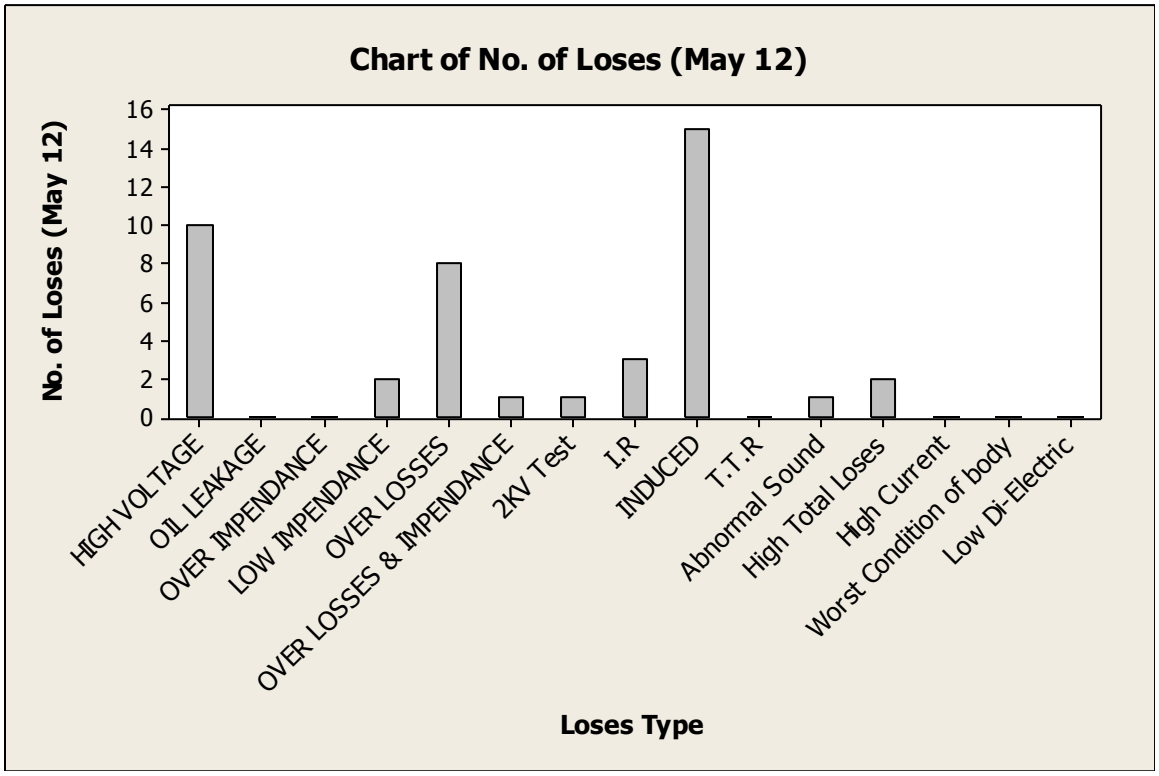


Chart of No. of Loses (May 12)
No. of Loses (May 12)
16
14
12
10
8
6
4
2
0
HIGH VOLTAGE
OIL LEAKAGE
OVER IMPENDANCE
LOW IMPENDANCE
OVER LOSSES
OVER LOSSES & IMPENDANCE
2KV Test
I.R
INDUCED
T.T.R
Abnormal Sound
High Total Loses
High Current
Worst Condition of body
Low Di-Electric
Loses Type

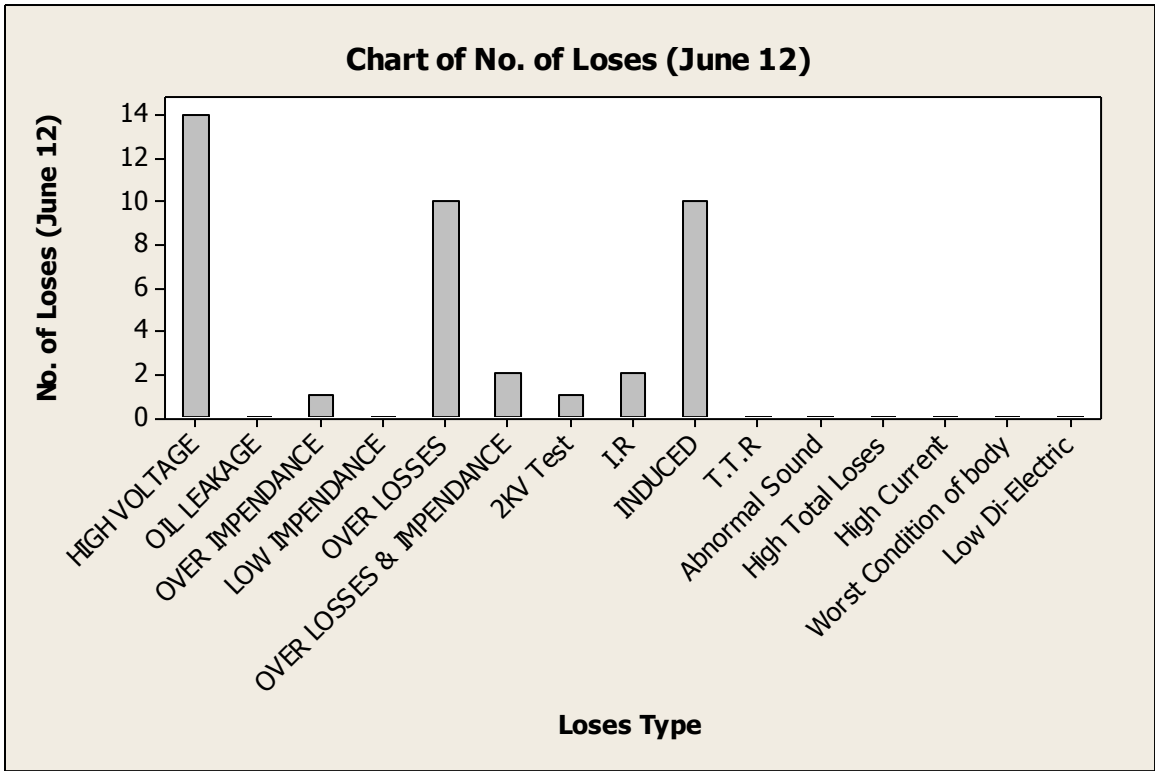


Chart of No. of Loses (June 12)
No. of Loses (June 12)
14
12
10
8
6
4
2
0
HIGH VOLTAGE
OIL LEAKAGE
OVER IMPENDANCE
LOW IMPENDANCE
OVER LOSSES
OVER LOSSES & IMPENDANCE
2KV Test
I.R
INDUCED
T.T.R
Abnormal Sound
High Total Loses
High Current
Worst Condition of body
Low Di-Electric
Loses Type

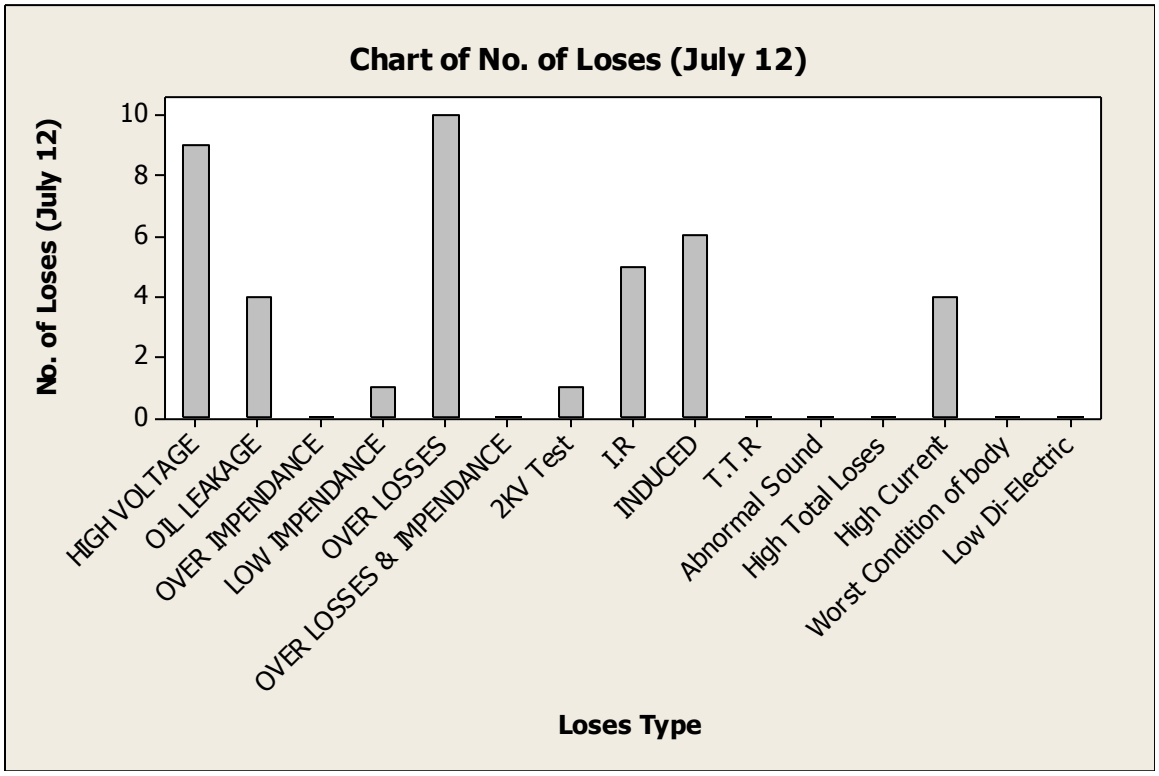


Chart of No. of Loses (July 12)
No. of Loses (July 12)
0
2
4
6
8
10
HIGH VOLTAGE
OIL LEAKAGE
OVER IMPENDANCE
LOW IMPENDANCE
OVER LOSSES
OVER LOSSES & IMPENDANCE
2KV Test
I.R
INDUCED
T.T.R
Abnormal Sound
High Total Loses
High Current
Worst Condition of body
Low Di-Electric
Loses Type

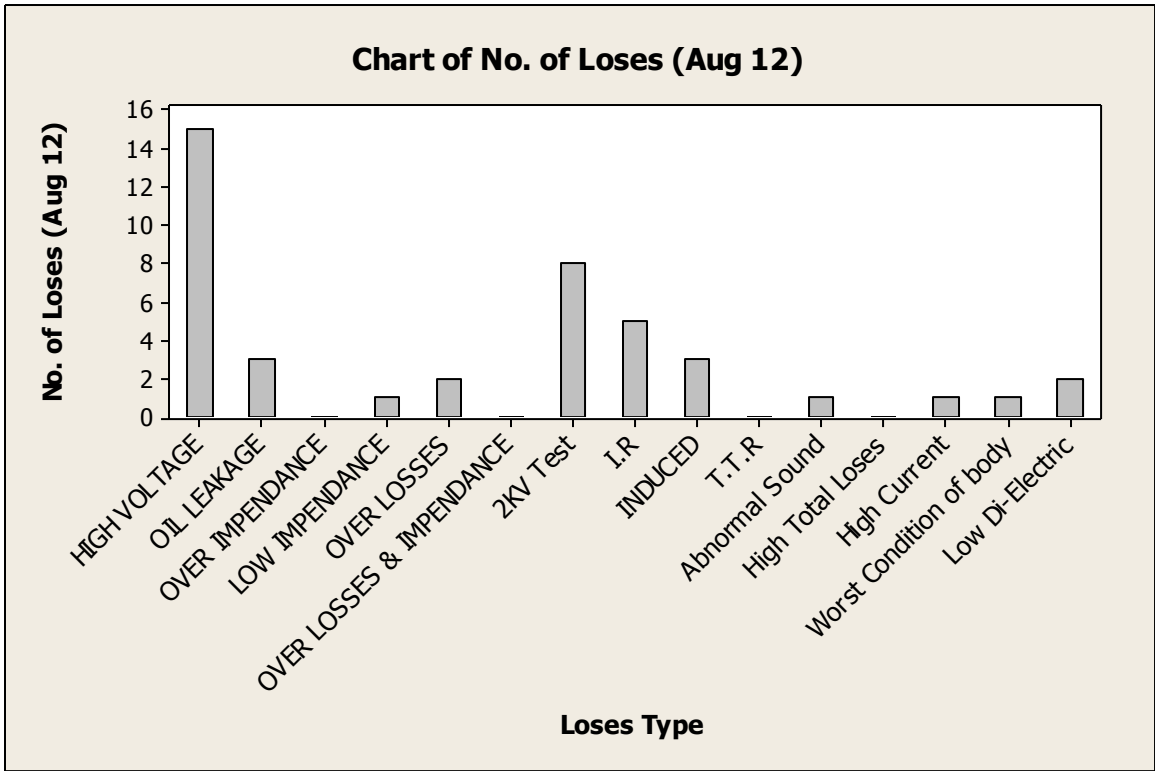
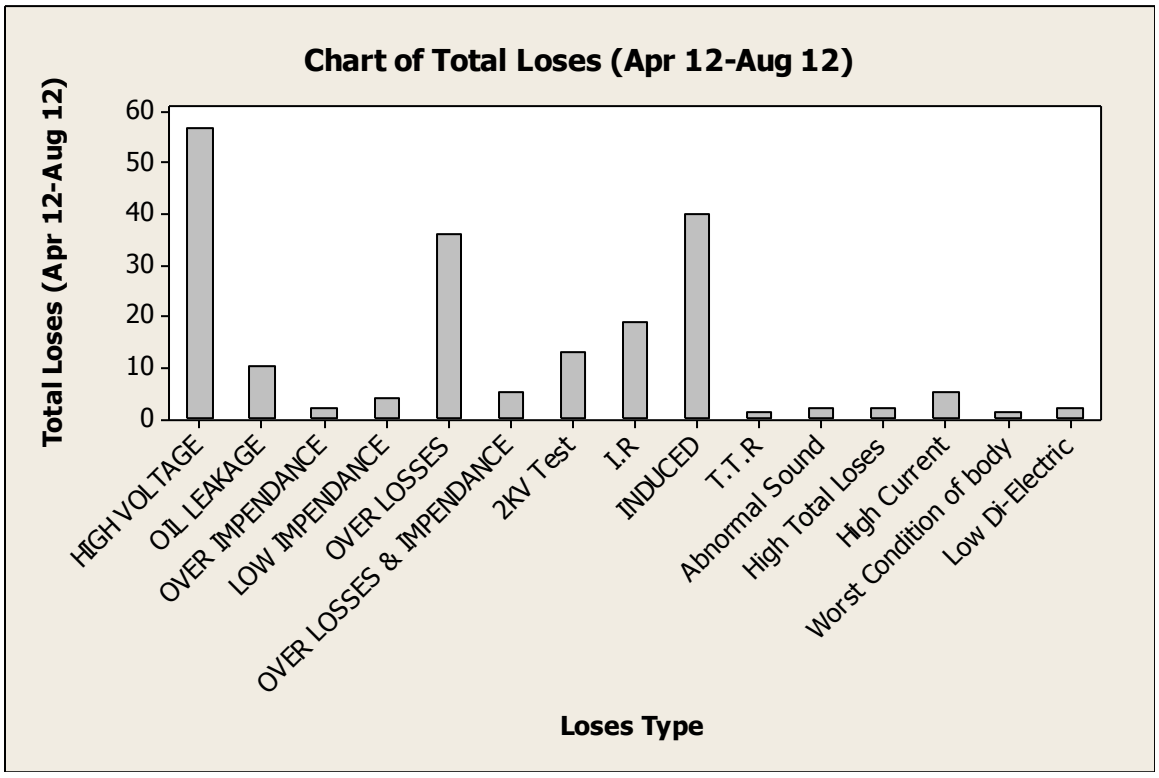


Chart of No. of Loses (Aug 12)
No. of Loses (Aug 12)
0
2
4
6
8
10
12
14
16
HIGH VOLTAGE
OIL LEAKAGE
OVER IMPENDANCE
LOW IMPENDANCE
OVER LOSSES
OVER LOSSES & IMPENDANCE
2KV Test
I.R
INDUCED
T.T.R
Abnormal Sound
High Total Loses
High Current
Worst Condition of body
Low Di-Electric
Loses Type

Total Loses in transformer during Apr 12 to Aug 12 are shown below;



6.1 Process Capability Analysis (Cp)

Process capability is the ability of a process to meet the specifications. The process capability analysis determines how the product specifications compare with the inherent variability in a process. The process capability analysis is useful in determining how well the process will hold the tolerances (the difference between specifications).

The following points should be before conducting a process capability analysis.

- Process capability should be assessed once the process has attained statistical control. This means that the special causes of variation have been identified and eliminated.
- In calculating process capability, the specifications limits are required in most cases, unrealistic and inaccurate specification limits may not provide correct process capability.
- Process capability analysis using a histogram or a control chart is based on the assumption that the assumption that the process characteristics follow a normal distribution. While the assumption of normality holds in many situations, there are cases where the process does not follow a normal distribution. Extreme care should be exercised where normality doses not hold. In cases where the data are not normal, it is important to determine the appropriate distribution to perform process capability analysis.

In case of non-normal data, appropriate data transformation techniques should be used to bring the data to normality.

If the upper and lower specification limits of the process are USL and LSL, the target process mean is T, the estimated mean of the process is μ and the estimated variability of the process (expressed as a standard deviation) is σ, then commonly accepted process capability indices include:

$$Cp = \frac{USL - LSL}{6\sigma}, \qquad CPU = \frac{USL - \mu}{3\sigma}, \qquad CPL = \frac{\mu - LSL}{3\sigma},$$

$$C_{pk} = \min \frac{USL - \mu}{3\sigma}, \frac{\mu - LSL}{3\sigma}$$

- Cp > 1; case of a centered process that is quite capable of meeting specifications.
- Cp = 1; Just capable (0.26% will fall outside).
- Cp < 1; not capable to meet the desired specifications.
- If the process is not centered, it is possible that even for a process Cp>1, some proportion of the product will be nonconforming.
- When Cp>1; there is flexibility that the process can go out of control yet still produce conforming items.

The data of no. of transformers repaired and no. of transformers passed/ failed has been compiled and process capability analysis conducted by taking the LSL = 0 and USL = 15.

S. No	**Month**	**No. of Trf Repaired**	**No. of Trf Passed**	**No. of Trf Failed**	**% Trf Failed / Month**
1	April 12	235	199	36	15.32
2	May 12	224	180	44	19.65
3	June 12	246	205	41	16.7
4	July 12	211	171	40	19.0
5	August 12	194	150	42	21.65

Mean = (15.32+19.65+16.7+19.0+21.65)/ 5

= 92.32 / 5

= 18.46

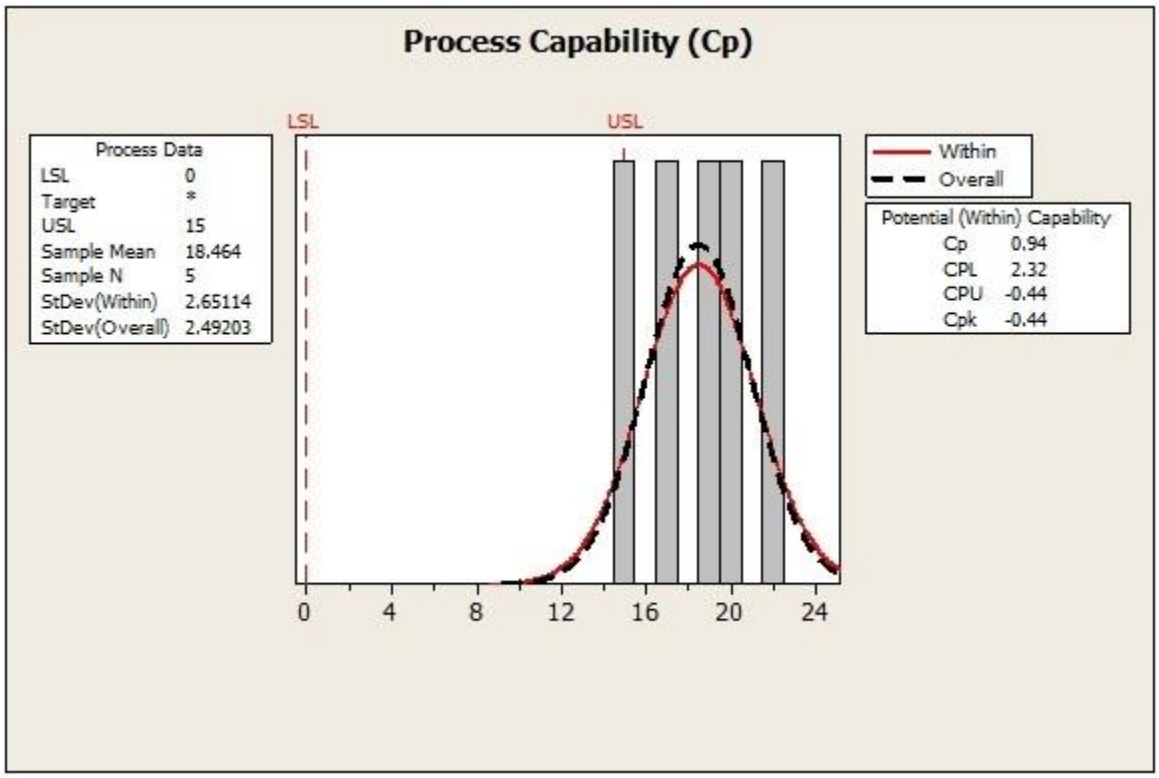


Figure 8: Process Capability Analysis of Transformer Repair Process (Start)

6.2 Pareto Analysis

Pareto analysis is an important tool in the quality improvement process. It helps management quickly identify the critical areas (those causing most of the problems) that deserve immediate action. They identify that problem whose resolution will lead to substantial improvements in quality. This analysis arranges problems in order of importance. The pareto analysis for the transformer failures has been done by Minitab v1.6 software and results are as follows:

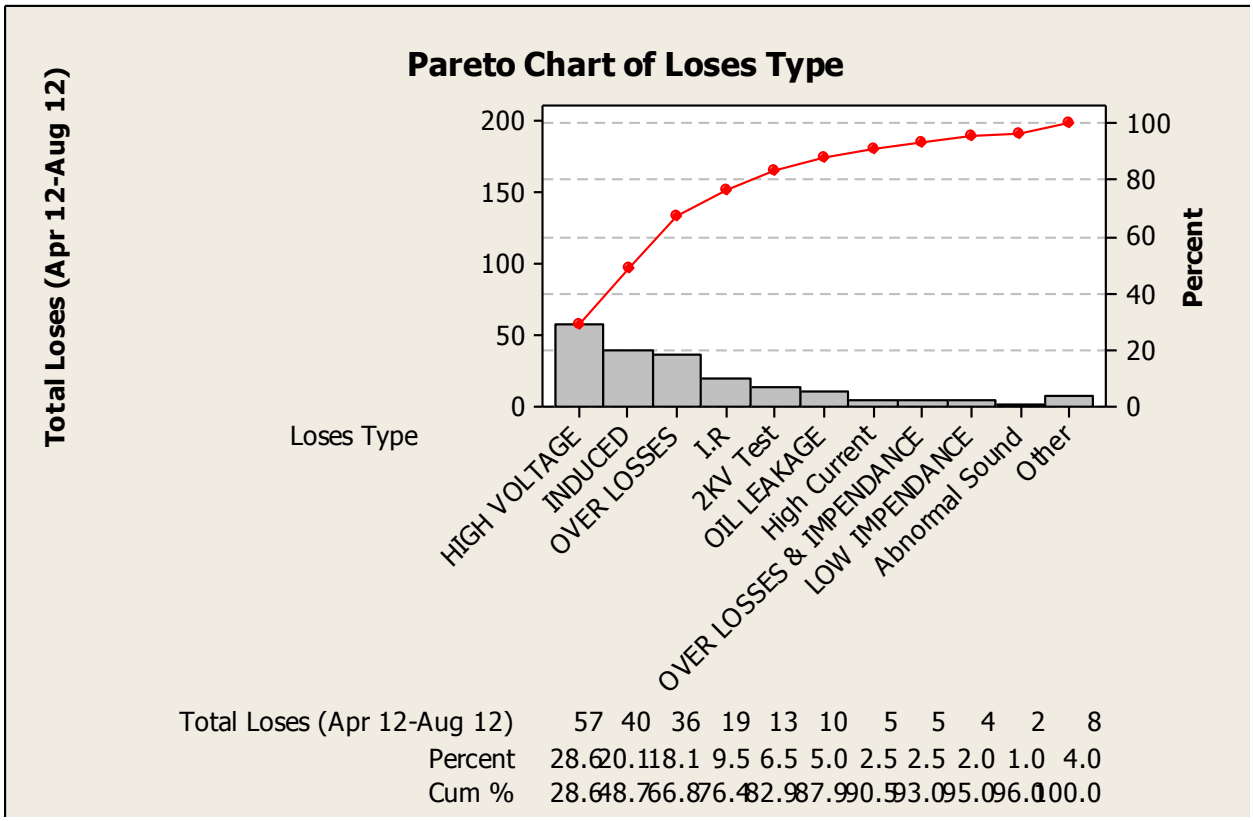


Figure 9: Pareto Analysis

From Pareto Analysis it was found that there are four major losses due to which large number of transformers failed at the time of final testing. The losses are;

1. High Voltage Test.
2. Induced Voltage Test.
3. Over Losses.
4. Insulation Resistance Test.

6.3 Possible Causes of Focused Problem

In order to get the root cause of the transformers failed at the time of final testing, I have used the fish bone diagram. A fish bone diagram helps grouping of different causes under one problem statement. Its structure represents the skeleton of a fish.

Steps in making of fish bone diagram are provided below:

- Identify the problem being analyzed. Write the problem inside the rectangle, on the right-hand side of a piece of paper. Trace a fishbone, facing from left to right towards the rectangle.
- List the primary categories inside the rectangles positioned near the large fish bones.
- Secondary causes raised in the brainstorming should be grouped together by similarity.

- Enter any other information that should be included in the diagram – e.g., title, date and persons responsible for the diagram.

After the analysis, various possible causes of the defined problem are identified and shown in the diagram below;

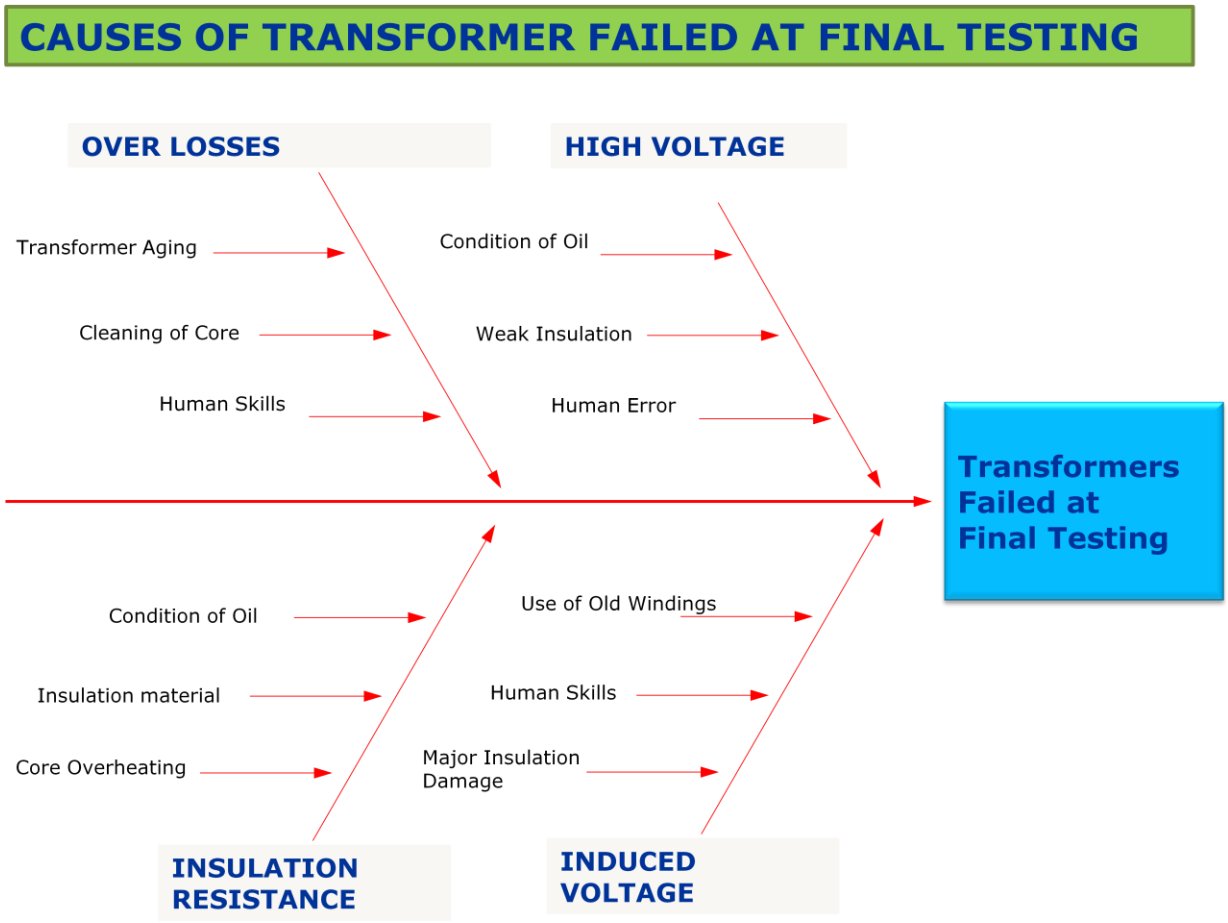


Figure 10: Cause and effect Diagram

6.4 Detect the Root Causes

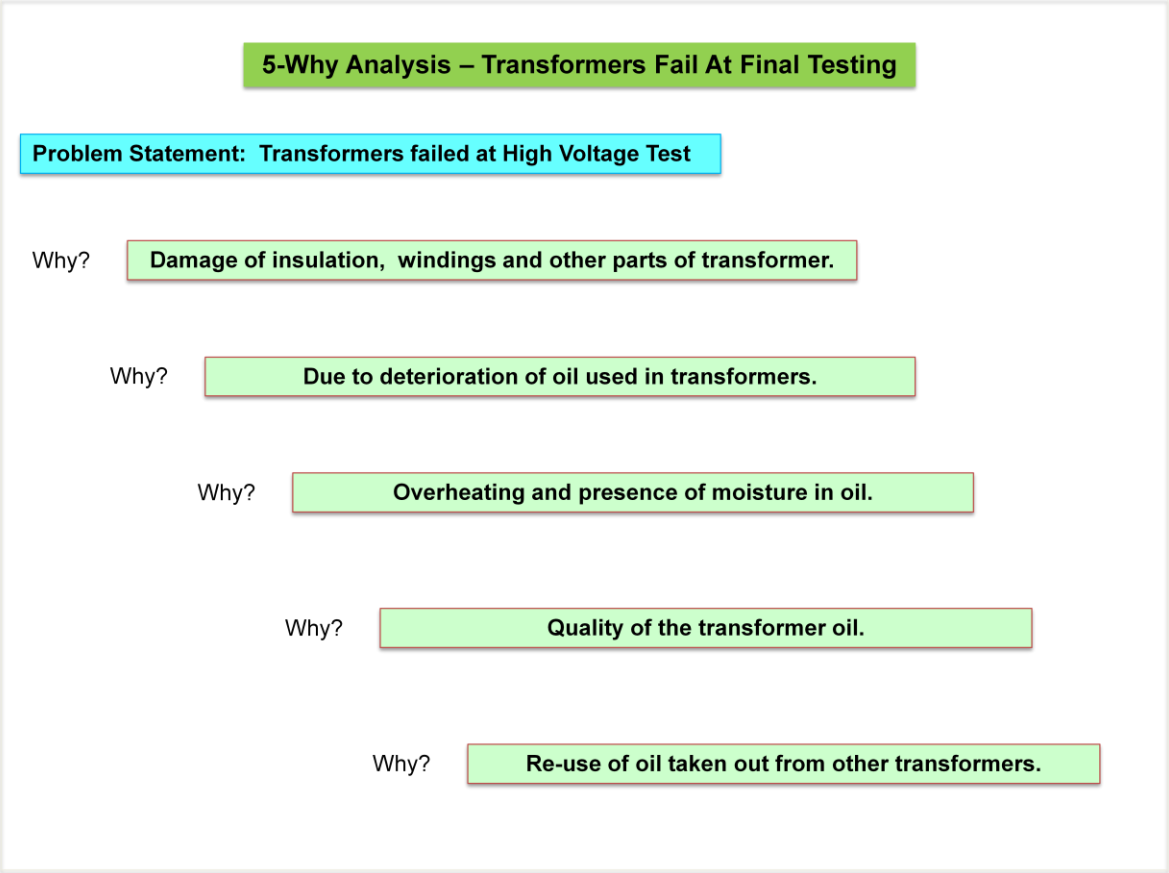
To identify the possible root causes of the focused problems, I have decided to use the 5 Why's Analysis.

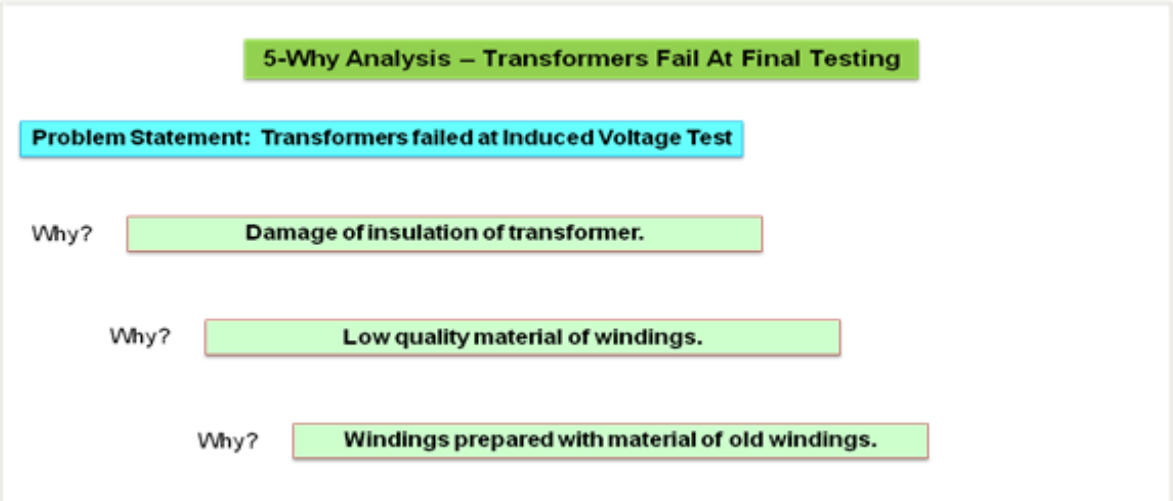
6.4.1 5 Whys Analysis

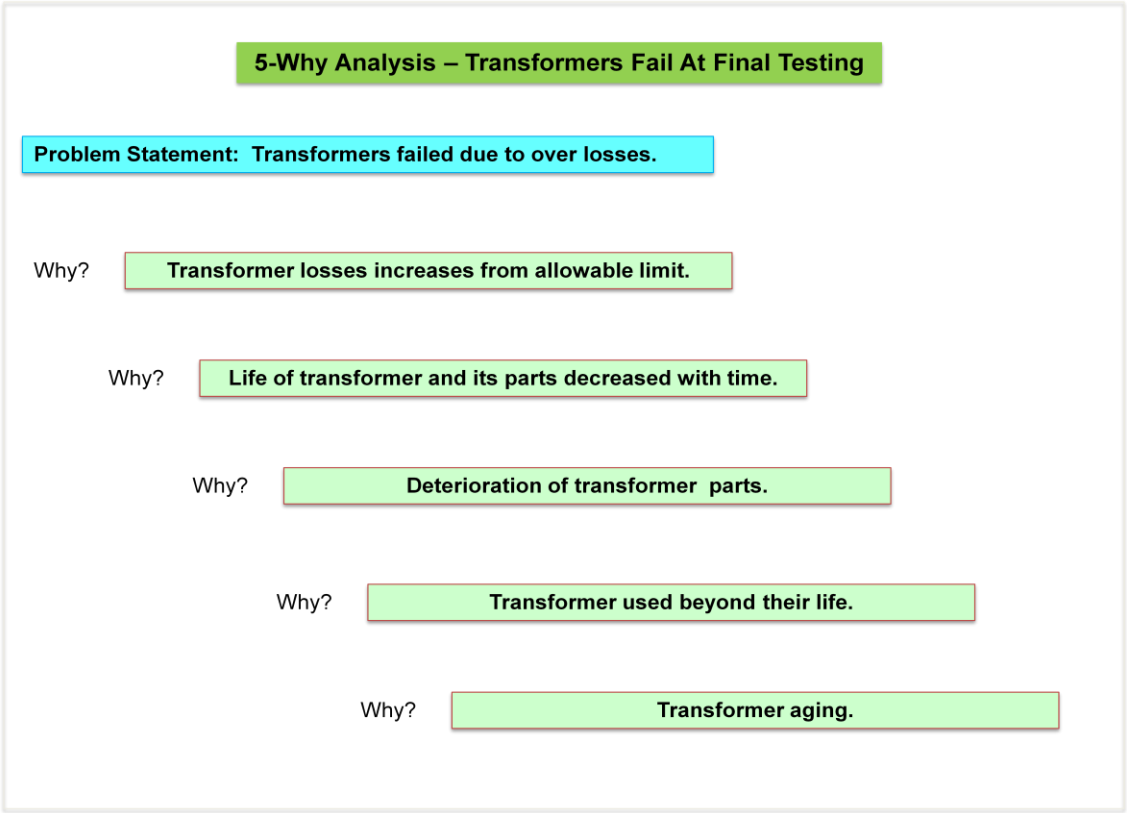
This tools consists of a series of 5 Why questions. Asking the questions repeatedly allows the personnel to think about the problem. It is not necessary that the process must be repeated 5 times. If a team gets its solution before, the process may be stopped. The steps used in building of 5 whys analysis is given below:

- Record all contributing causes identified in the fishbone diagram in the column for the first round of questioning, entering one cause per sheet.
- Assess contributing causes and leave others.

I have performed 5 why analysis for three problems as shown below;







7 Identify Solutions

7.1 5W 1H Tool

It is very important tool used in finding the solutions of the problems. This approach seeks to answer six basic questions in gathering information about nearly any problem: Who, What, When, Where, Why and How.

Root cause: Large number of transformer failed at final testing due to Use of old oil and Use of old winding material.					
What	**Where**	**Who**	**Why**	**How**	**When**
Use of old Oil	During repair and maintenance of transformer	KESC Management	Low price	Use of new oil with regenerated oil	As soon as possible
Use of old winding material	During repair and maintenance of transformer	KESC Management	Saving material cost	Use of new winding material	As soon as possible
Transformer ageing	In transformer	Company policy	Shortage of new transformer	Scrap old transformer	As soon as possible

7.2 Financial Impact

To show the financial impact of the identified solutions, I have selected the 250 kVA capacity transformer.

7.2.1 Financial Impact of Using New Oil with Regenerated Oil

The details of the parameters used in the financial analysis are;

- Quantity of oil used in the 250 kVA transformer = 425 Liters.
- Cost of the old oil / Lit = Rs. 1.00
- Cost of old oil / Trf = Rs. 425.00
- Cost of the new oil/ Lit = Rs. 140.00
- Cost of the regenerated oil/ Lit = Rs. 70.00
- Proportion of New oil and Regenerated oil = 25 % and 75 % resp.
- Cost of New & Regenerated oil / Trf = Rs.37,188 .00

S. No	Capacity (kVA)	Duration	No. of Trf Failed (A)	Oil Used	Avg Repair Cost/ Trf (Rs) (B)
01	250	Apr 12 to Aug 12	27	Old Oil	177,940.00
02	250	Dec 12 to Apr 13	02	New Oil with Regenerated oil	239,873.00

In the duration of Apr '12 to Aug'12 the old oil was used in the 250 kVA transformers which cause the failure of 27 transformers.

In the duration of Dec 12 to Apr 13 the new oil with regenerated oil was used due to which only 02 transformers failed. Hence the loss has been reduced due to use of new oil with regenerated oil.

7.2.2 Financial Impact of Using New Winding Material

The details of the parameters used in the financial analysis are;

- Cost of the old transformer winding = Rs. 10,000.00
- Cost of the new transformer winding = Rs. 50,000.00

S. No	Capacity (kVA)	Duration	No. of Trf Failed	Winding Used	Avg Repair Cost/ Trf (Rs)
01	250	Apr 12 to Aug 12	23	Old Winding	139,531.00
02	250	Dec 12 to Apr 13	01	New Winding	239,873.00

In the duration of Apr '12 to Aug'12 the transformer windings were prepared from old material due to which 23 transformers were failed.

In duration of Dec'12 to Apr'13 the transformer windings were prepared from new material due to which the losses of transformers reduced as shown in the table.

7.3 Findings during research

1. Large number of refurbished transformers failed at the final tests performed on the transformers to check its performance before installation at site.

2. There are number of tests performed on the refurbished transformers and majority of transformers failed in the following tests:

    a. High voltage test.
    b. Induced voltage test.
    c. Due to over losses.

3. Transformers failed in high voltage test due to the use of old & contaminated oil taken out from other transformers.

4. Transformers failed in induced voltage test due to use of old winding material during winding repair process.

5. Number of transformers failed due to over losses because they are using beyond their working life.

7.4 Suggestions for improvement

1. Proportion of new oil needs to be increased in the total oil used in transformer.

2. New winding material should be used in preparation of windings for the refurbished transformers.

3. Change the design of windings to reduce the over losses in the refurbished transformers.

4. Transformers that completed their life should be scraped.

5. Trainings, workshops and seminars be arranged for the workshop personnel's to enhance their skills and capabilities.

6. Vacuum process be used for filling of oil in transformers, so that the moisture contents would be minimum in transformer oil.

8 Conclusion

Karachi Electric Supply Company (KESC) is the only vertically integrated power utility in Pakistan which currently provides electricity to over 2.1 million consumers. This company has been facing a problem of repetitive failures of refurbished transformers at the final testing stage for many years. Hence, the identification of the primary causes of failure and the subsequent analysis enable recommendations for corrective action to be made that will reduce the failure of refurbished transformers.

During research it has been found that many factors are involve in affecting the reliability of refurbished transformers such as; contaminated oil and used copper windings taken out from other transformers have been re-used in the transformers which cause the failure of majority of transformers at final testing stage. Most of the transformers have completed their working life but still they are in use. Due to the ageing factor they are not able to sustain the required load and failed when the full load applied.

The failure of the refurbished transformers can be decreased from different aspects, by increasing the proportion of new oil in the total quantity of oil used in the transformer, the windings may be prepared from the new copper instead of the old copper taken out from other transformers, trainings and workshops can be a useful tool to enhance the skills of manpower.

9 Future Research Areas

- Similar research for other transformer repair workshops (i.e Siemens etc) and comparing the results to establish difference/divergence and reasons for such difference.
- Detailed economic value analysis for the identified root causes of transformer failure.
- Analysis of Mean Time To First Failure (MTTFF) and Mean Time Between Failures (MTBF) of transformers to check the reliability of refurbishment process.

APPENDIX A

DATA COLLECTION SHEET

Data Collection Sheet - April 2012

S.NO	Date of Inspection	Make	Rating (KVA)	TSW Sr. No.	Refur. Earlier by TSW (Yes/No)	IR Test (HT-E=150, HT-LT=150, LT-E=100) MΩ	% Impedance	Losses ≤ 15% for 250kVA & 20% for others	Dielectric Strength ≥ 30 kV	Condition Of Oil	Physical Discrepancy	Inspection result
										New/Old		
1	27-Mar-12	CLIMAX	1000	3620/08								Failed In High Voltage Test
2		PEL	250	5687/12		200-300-200	4.97	-5.8	45	OLD	Tap Changer By Pass	Passed
3		PEL	250	5185/11		300-300-200	4.20	-3.8	55	OLD	Tap Changer By Pass	Passed
4		PEL	50	1972/04		400-500-400	4.02	-10.7	65	OLD	Tap Changer By Pass	Passed
5		T/POWER	250	260/02		200-150-150	3.97	4.5	61	OLD	Tap Changer By Pass	Passed
6		CLIMAX	250	807/03		300-300-300	4.60	-1.70	49	OLD	Tap Changer By Pass	Passed
7		T/POWER	250	5866/12		200-200-200	4.39	1.10	44	OLD	Tap Changer Functional	Passed
8		CLIMAX	250	913/03		200-200-150	4.61	-2.6	59	OLD	Tap Changer By Pass	Passed
9	28-Mar-12	T/POWER	150	5854/12		200-400-200	5.37	12.80	55	OLD	Tap Changer Functional	Passed
10		PEL	50	5855/12		700-700-600	3.90	3.5	67	OLD	Tap Changer By Pass	Passed
11		J&P	500	5868/12		150-150-150	4.48	-1.3	49	OLD	Tap Changer By Pass	Passed
12		ELMETEC	100	5869/12		300-300-200	3.70	-5.6	46	OLD	Tap Changer Functional	Passed
13		PEL	200	5846/12		300-400-200	3.79	-12.3	61	OLD	Tap Changer By Pass	Passed
14		PEL	200	1016/03		200-250-100	4.42	-8.30	58	OLD	Tap Changer By Pass	Passed

15		CLIMAX	50	3486/06		200-200-150	3.83	-0.30	65	OLD	Tap Changer Functional	Passed
16		PEL	50	4025/09		400-500-400	4.02	-11.7	65	OLD	Tap Changer By Pass	Passed
17		PEL	1500	5870/12		200-300-150	4.69	12.5	38	OLD	Tap Changer Functional	Passed
18		CLIMAX	250	1043/03		200-150-100	4.9	-1.5	38	OLD	Tap Changer By Pass	Passed
19		J&P	150	5635/11		300-300-150	4.79	-5.4	43	OLD	Tap Changer By Pass	Passed
20		T/PAK	250	3199/07		200-200-200	4.32	-4.7	39	OLD	Tap Changer By Pass	Passed
21		MML	250	5757/12		300-250-400	4.19	-7.3	41	OLD	Tap Changer By Pass	Passed
22		CLIMAX	150	3356/07		300-300-300	4.1	-22.3	39	OLD	Tap Changer By Pass	Passed
23		PEL	100	5871/12		400-300-400	4.02	-13.3	42	OLD	Tap Changer By Pass	Passed
24		CLIMAX	500	3212/05						OLD	Tap Changer By Pass	Failed Due To Oil Leakage
25		J&P	500	5731/12		1000-1000-600	4.4	4.5	42	OLD	Tap Changer By Pass	Passed
26		PEL	250	5035/10		400-400-200				OLD	Tap Changer By Pass	Failed In High Voltage Test
27	30-Mar-12	PEL	250	5872/12		200-200-150	4.34	1.9	39	OLD	Tap Changer By Pass	Passed
28		T/PAK	500	5874/12		800-800-800	4.88	-0.30	48	OLD	Tap Changer By Pass	Passed
29		T/PAK	250	5875/12		200-300-300	4.99	3.9	50	OLD	Tap Changer By Pass	Passed
30	31-Mar-12	CLIMAX	500	435/02		200-400-300	5.62	14.5	65	OLD	Tap Changer By Pass	Passed
31		T/PAK	250	5876/12		500-500-500	4.61	-3.6	60	OLD	Tap Changer By Pass	Passed
32		PEL	400	5877/12		200-200-150	3.79	-13.1	45	OLD	Tap Changer By Pass	Passed
33		PEL	200	5878/12		400-400-250	3.72	-9.00	40	OLD	Tap Changer	Passed

											By Pass	
34		J&P	1000	3495/08		500-600-500	4.68	4.90	60	NEW	Tap Changer By Pass	Passed
35		T/POWER	250	5879/12		250-250-250	5.08	1.5	55	OLD	Tap Changer By Pass	Passed
36	02-Apr-12	CLIMAX	250	5576/11		200-200-200	4.6	-7	42	OLD	Tap Changer Bypass	Passed
37		SIEMENS	500	1415/03		300-300-500	4.6	5.6	56	OLD	Tap Changer Bypass	Passed
38		J&P	500	150/02		400-500-500	4.88	3	39	OLD	Tap Changer Bypass	Passed
39		CLIMAX	500	2730/05		200-200-300	4.98	14.2	59	OLD	Tap Changer Bypass	Passed
40		T/PAK	250	5880/12		250-200-400	4.52	-5.4	59	OLD	Tap Changer Bypass	Passed
41		MML	250	832/03		300-400-500	4.16	-6.8	46	OLD	Tap Changer Bypass	Passed
42		PEL	250	5035/10		600-600-500	4.24	-9.7	49	OLD	Tap Changer Bypass	Passed
43		CLIMAX	500	3212/07		400-500-400	5.25	14.6	56	OLD	Tap Changer Bypass	Failed In Ttr Test
44	03-Apr-12	T/PAK	250	4922/10		200-200-200	4.66	-1.30	50	OLD	Tap Changer By Pass	Passed
45		PEL	250	4688/10		500-500-400	3.87	4.6	53	OLD	Tap Changer By Pass	Passed
46		CLIMAX	250	5409/11		500-500-500	4.70	-2.2	44	OLD	Tap Changer By Pass	Passed
47		T/PAK	500	5881/12		200-400-500	5.30	18.7	42	OLD	Tap Changer By Pass	Passed
48		CLIMAX	250	3691/08		500-500-500	5.44	-2.7	55	OLD	Tap Changer By Pass	Passed
49		PEL	250	5045/10								Failed Due To Oil Leakage
50		PEL	250	5882/12								Failed Due To Oil Leakage
51		PEL	250	5883/12		400-500-300	4.70	-7.1	48	OLD	Tap Changer By Pass	Passed
52	04-Apr-12	T/PAK	250	4864/10		250-300-400	4.71	0.30	56	OLD	Tap Changer	Passed

											By Pass	
53		PEL	50	5884/12		500-500-400	4.10	-8.10	59	OLD	Tap Changer By Pass	Passed
54		PEL	200	5885/12		200-200-200	3.99	-18.5	46	OLD	Tap Changer By Pass	Passed
55		PEL	200	5886/12		400-400-200	4.26	-6.80	48	OLD	Tap Changer By Pass	Passed
56		CLIMAX	250	5887/12		200-200-200	4.70	3.20	42	OLD	Tap Changer By Pass	Passed
57		T/PAK	500	5888/12		400-500-400	5.53	8.20	44	OLD	Tap Changer By Pass	Passed
58		PEL	250	5882/12		500-500-400	4.70	-2.90	50	OLD	Tap Changer Functional	Passed
59		PEL	250	5045/10		400-500-400	4.61	-7.50	49	OLD	Tap Changer Functional	Passed
60	05-Apr-12	PEL	250	2613/05		300-200-200	5.05	4.60	52	OLD	Tap Changer By Pass	Passed
61		J&P	250	706/03		500-500-200	4.54	2.20	60	NEW	Tap Changer By Pass	Passed
62		CLIMAX	250	686/02		150-200-150	4.79	-7	64	OLD	Tap Changer By Pass	Passed
63		J&P	250	5889/12		150-150-100	4.61	-1.60	61	OLD	Tap Changer By Pass	Passed
64		CLIMAX	250	5890/12		300-300-200	5.07	4.50	46	NEW	Tap Changer By Pass	Passed
65		PEL	50	888/03		500-600-500	4.14	-12.70	63	NEW	Tap Changer By Pass	Passed
66		PEL	50	2414/05								Failed In High Voltage Test
67	06-Apr-12	SIEMENS	50	5892/12		200-200-150	4.55	17.60	42	NEW	Tap Changer Functional	Passed
68		SIEMENS	50	5893/12		1000-1000-1000	4.00	1.60	49	NEW	Tap Changer Functional	Passed
69		SIEMENS	50	5894/12		500-500-400	3.75	-4.00	38	OLD	Tap Changer By Pass	Passed
70		CLIMAX	500	3212/07		150-150-150	5.67	20.30				Failed Due To Over Losses

71		PEL	200	5895/12		100-100-70	3.87	-8.60				Failed In I.R Test
72		CLIMAX	250	5363/11		250-250-200	4.28	-3.50	47	NEW	Tap Changer By Pass	Passed
73		CLIMAX	250	5891/12		200-200-150	4.68	11.40	45	NEW	Tap Changer By Pass	Passed
74	07-Apr-12	SIEMENS	50	5896/12		500-800-500	3.60	-16.10	46	OLD	Tap Changer By Pass	Passed
75		CLIMAX	250	798/03		200-250-200	4.75	-3.40	52	OLD	Tap Changer By Pass	Passed
76		PEL	250	1505/03		250-250-300	4.89	5.40	47	OLD	Tap Changer By Pass	Passed
77		CLIMAX	100	5899/12		600-500-500	3.84	-14.20	39	NEW	Tap Changer By Pass	Passed
78		SIEMENS	250	4901/10		600-500-500	4.99	2.60	39	NEW	Tap Changer By Pass	Passed
79		CLIMAX	1000	2147/04		500-400-800	5.44	23.90	39	NEW	Tap Changer By Pass	Passed Request By Im
80	09-Apr-12	SIEMENS	250	3277/07		300-400-200	4.98	-2.90	42	OLD	Tap Changer By Pass	Passed
81		PEL	250	5900/12		200-300-200	5.08	12.70	34	OLD	Tap Changer By Pass	Passed
82		CLIMAX	250	2323/05		200-400-250	5.35	8.80	39	NEW	Tap Changer By Pass	Passed
83		SIEMENS	100	5901/12		1500-1500-1500	4.20	-1.70	39	NEW	Tap Changer Functional	Passed
84		PEL	200	5902/12		1000-1000-1000	4.04	-3.50	46	NEW	Tap Changer Functional	Passed
85		CLIMAX	250	5897/12								Failed In 2kv Test
86		SIEMENS	50	5903/12		300-300-200	4.13	-5.50	39	NEW	Tap Changer By Pass	Passed
87		PEL	50	2414/05		1000-1000-1000	4.09	-18.10	38	NEW	Tap Changer By Pass	Passed
88	10-Apr-12	CLIMAX	250	5904/12		300-400-300	4.36	17.70	39	OLD	Tap Changer By Pass	Failed Due To Over Losses
89		CLIMAX	250	1754/04		400-400-600	4.94	4.60	45	OLD	Tap Changer Functional	Passed

90		PEL	250	5905/12		300-400-200	5.46	13.70	39	OLD	Tap Changer By Pass	Passed
91		CLIMAX	250	906/03		300-400-250	4.98	-3.10	55	OLD	Tap Changer By Pass	Passed
92		PEL	50	1744/04		800-800-700	4.42	-3.00	40	OLD	Tap Changer By Pass	Passed
93		SIEMENS	500	5355/11		150-200-200	4.32	4.70	40	OLD	Tap Changer By Pass	Passed
94		T/PAK	250	2107/05		200-200-150	4.90	4.00	39	OLD	Tap Changer By Pass	Passed
95		CLIMAX	500	3212/07		800-800-500	5.69	20.70	48	OLD	Tap Changer By Pass	Failed Due To Over Losses & Over Impendence
96		PEL	200	5895/12		200-200-150	3.94	1.70	40	OLD	Tap Changer By Pass	Passed
97		T/PAK	250	5906/12		500-600-500	4.71	-13.80	39	OLD	Tap Changer By Pass	Passed
98		J&P	250	5656/11		300-300-150	4.42	-6.60	45	NEW	Tap Changer By Pass	Passed
99		CLIMAX	250	5907/12		500-500-400	4.34	0.20	40	OLD	Tap Changer By Pass	Passed
100	11-Apr-12	PEL	250	5910/12		1000-1000-600	4.72	2.70	58	NEW	Tap Changer By Pass	Passed
101		PEL	250	5277/11		300-500-300	4.72	3.50	52	NEW	Tap Changer By Pass	Passed
102		CLIMAX	250	1468/03		1000-1000-1000	4.77	9.40	60	NEW	Tap Changer By Pass	Passed
103		CLIMAX	250	5908/12		1000-1000-600	4.36	12.10	48	NEW	Tap Changer By Pass	Passed
104		PEL	250	4603/10		1000-1000-1000	5.10	10.50	61	NEW	Tap Changer By Pass	Passed
105		CLIMAX	250	5911/12		1000-1000-500	4.53	6.90	38	NEW	Tap Changer By Pass	Passed
106		PEL	250	5912/12		600-600-500	5.09	3.50	49	NEW	Tap Changer By Pass	Passed
107		SIEMENS	50	5909/12		1000-1000-1000	4.07	7.20	60	NEW	Tap Changer By Pass	Passed

108	12-Apr-12	PEL	250	5913/12		200-300-200	4.17	7.10	48	NEW	Tap Changer Functional	Passed
109		CLIMAX	250	2648/08		400-400-6	4.90	7.30		NEW	Tap Changer By Pass	Failed In I.R Test
110		PEL	50	2421/05		500-500-200	4.15	5.30	45	NEW	Tap Changer By Pass	Passed
111		PEL	250	4612/10		200-250-200	4.21	0.80	52	NEW	Tap Changer By Pass	Passed
112		CLIMAX	250	5914/12		500-500-500	4.89	-1.70	55	NEW	Tap Changer By Pass	Passed
113		T/PAK	250	5915/12		700-500-500	5.37	11.20	40	NEW	Tap Changer By Pass	Passed
114	13-Apr-12	SIEMENS	500	3472/08		500-500-400	4.38	7.10	46	NEW	Tap Changer By Pass	Passed
115		CLIMAX	250	1491/03		500-500-300	4.62	14.70	36	NEW	Tap Changer By Pass	Passed
116		CLIMAX	250	5916/12		700-600-500	4.99	2.80	40	NEW	Tap Changer By Pass	Passed
117		PEL	250	4980/10								Failed In 2kv Test
118		ELMETEC	250	5917/12		400-400-100	5.07	-8.70	42	NEW	Tap Changer By Pass	Passed
119		CLIMAX	250	2090/04		700-1000-500	4.81	6.90	36	NEW	Tap Changer By Pass	Passed
120	14-Apr-12	PEL	200	5920/12		200-300-300	4.11	-13.20	54	OLD	Tap Changer By Pass	Passed
121		CLIMAX	500	5352/11		500-500-300	5.07	16.80	58	NEW	Tap Changer By Pass	Passed
122		CLIMAX	100	5919/12		400-300-300	3.71	-17.20	60	OLD	Tap Changer By Pass	Passed
123		J&P	250	481/02		350-400-300	5.07	-6.50	48	OLD	Tap Changer By Pass	Passed
124		CLIMAX	250	920/03		400-400-400	4.09	4.40	50	NEW	Tap Changer By Pass	Passed
125		CLIMAX	250	5373/11		150-150-150	4.89	-0.20	42	OLD	Tap Changer By Pass	Passed
126		CLIMAX	250	5918/12						OLD	Tap Changer By Pass	Failed In Induced Test
127		T/PAK	250	3780/09		200-400-300	5.54	6.70	57	NEW	Tap Changer	Passed

											By Pass	
128		T/PAK	500	5928/12		500-500-500	5.25	-4.30	40	NEW	Tap Changer By Pass	Passed
129		SIEMENS	500	3423/08		1000-1000-1000	4.07	20.00	52	NEW	Tap Changer Functional	Passed
130		PEL	250	4980/10		1000-1000-600	4.70	-5.80	38	OLD	Tap Changer Functional	Passed
131		CLIMAX	250	5921/12		350-400-200	4.43	3.50	44	OLD	Tap Changer By Pass	Passed
132		CLIMAX	250	5922/12		250-300-200	4.72	7.80	51	OLD	Tap Changer By Pass	Passed
133		CLIMAX	250	3233/07		500-400-400	4.52	-2.60	69	OLD	Tap Changer By Pass	Passed
134	16-Apr-12	CLIMAX	250	5923/12		300-500-300	4.91	13.80	48	OLD	Tap Changer Functional	Passed
135		T/POWER	250	5924/12							Tap Changer By Pass	Failed In High Voltage Test
136		CLIMAX	50	2644/05		400-400-300	4.40	1.00	48	OLD	Tap Changer By Pass	Passed
137		CLIMAX	250	5927/12		200-200-200	4.52	-0.20	38	OLD	Tap Changer By Pass	Passed
138		CLIMAX	250	5925/12		300-300-200	4.89	5.00	42	OLD	Tap Changer By Pass	Passed
139		T/POWER	250	5926/12		300-500-300	5.17	-0.10	44	OLD	Tap Changer Functional	Passed
140		J&P	500	2897/06		1000-1000-1000	5.44	5.50	42	NEW	Tap Changer By Pass	Passed
141	17-Apr-12	T/PAK	500	613/02		700-500-700	5.59	22.10	51	NEW	Tap Changer By Pass	Failed Due To Over Losses & Over Impendence
142		T/POWER	250	5929/12		1000-1000-700	4.99	-4.10	38	OLD	Tap Changer Functional	Passed
143		CLIMAX	250	4492/10		1000-1000-1000	4.66	4.10	43	NEW	Tap Changer Functional	Passed
144		PEL	250	5284/11		800-800-800	4.72	5.00	39	OLD	Tap Changer	Passed

											By Pass	
145		J&P	250	5930/12		1000-1000-1000	4.52	-2.60	48	NEW	Tap Changer By Pass	Passed
146	18-Apr-12	CLIMAX	250	5932/12		500-600-500	4.9	6.2	56	NEW	Tap Changer By Pass	Passed
147		CLIMAX	250	2581/05		500-500-400	4.6	9	40	OLD	Tap Changer By Pass	Passed
148		J&P	500	5447/11		1000-1000-500	5.06	1.8	45	NEW	Tap Changer Functional	Passed
149		CLIMAX	250	2648/05		300-300-150	4.9	10.9	39	OLD	Tap Changer Functional	Passed
150		T/POWER	250	5924/12		300-300-200	5.3	4.6	52	OLD	Tap Changer By Pass	Passed
151		SIEMENS	100	5933/12								Failed In Induced Test
152		SIEMENS	500	5931/12								Failed In High Voltage Test
153	19-Apr-12	CLIMAX	250	5897/12		500-600-500	4.6	1.9	42	OLD	Tap Changer By Pass	Passed
154		CLIMAX	250	5934/12		400-500-500	4.6	12.7	49	OLD	Tap Changer By Pass	Passed
155		PEL	500	4533/10		500-600-500	4.7	0.1	51	OLD	Tap Changer By Pass	Passed
156		CLIMAX	500	5935/12		800-1000-800	5.45	17.2	39	OLD	Tap Changer By Pass	Passed
157		CLIMAX	250	5936/12		400-400-400	4.7	2.9	43	NEW	Tap Changer By Pass	Passed
158		CLIMAX	500	5196/11		400-300-300	4.9	23.3	38	OLD	Tap Changer By Pass	Failed Due To Over Losses
159	20-Apr-12	SIEMENS	100	5937/12	NO	500-600-500	4.16	-4.6	53	NEW	Tap Changer Functional	Passed
160		CLIMAX	500	5196/11	YES	500-500-500	4.98	16.4	49	OLD	Tap Changer By Pass	Passed
161		CLIMAX	500	1100/03	YES	400-500-400	5.45	19.5	39	OLD	Tap Changer By Pass	Passed
162		PEL	500	5938/12	NO	600-500-600	4.79	2.4	38	OLD	Tap Changer	Passed

											By Pass	
163		CLIMAX	250	2256/04	YES							Failed In Induced Test
164		SIEMENS	250	3732/08	YES	400-400-300	4.85	-6.3	41	OLD	Tap Changer By Pass	Passed
165		SIEMENS	750	867/03	YES							Failed In Induced Test
166	21-Apr-12	PEL	250	5939/12	NO	300-300-200	5.28	9.5	51	OLD	Tap Changer By Pass	Passed
167		J&P	250	5940/12	NO	300-300-200	5.07	-14.3	48	OLD	Tap Changer By Pass	Passed
168		J&P	1000	5782/11	YES	400-400-300	4.5	8.4	39	OLD	Tap Changer Functional	Passed
169		CLIMAX	500	5604/11	YES	300-300-200	5.43	-0.2	33	OLD	Tap Changer By Pass	Passed
170		PEL	500	5941/12	NO	300-300-200	4.7	14.2	41	OLD	Tap Changer By Pass	Passed
171		SIEMENS	100	5933/12	NO	300-300-300	3.82	-16.8	56	OLD	Tap Changer Functional	Passed
172		CLIMAX	50	1977/04	YES	400-300-300	4.4	1.7	50	OLD	Tap Changer By Pass	Passed
173	23-Apr-12	T/POWER	250	5942/12	NO	250-250-250	5.37	8.8	39.9	OLD	Tap Changer Functional	Passed
174		CLIMAX	250	1316/03	YES	250-250-200	4.63	7.2	65	OLD	Tap Changer Functional	Passed
175		SIEMENS	50	5943/12	NO	400-500-300	3.77	-26.4	43	OLD	Tap Changer By Pass	Passed
176		SIEMENS	50	5944/12	NO	250-250-250	3.95	6.3	37	OLD	Tap Changer By Pass	Passed
177		PEL	250	5904/12	NO	300-300-250	4.45	14.8	52	OLD	Tap Changer By Pass	Passed
178		CLIMAX	150	1699/04	YES	250-300-200	4.44	25.2	59	OLD	Tap Changer By Pass	Failed Due To Over Losses
179		CLIMAX	250	2368/05	YES	250-250-200	4.99	13.9	53.13	OLD	Tap Changer By Pass	Passed
180		PEL	250	5945/12	NO	250-250-200	5.08	-3	36.19	OLD	Tap Changer By Pass	Passed

181		CLIMAX	500	2899/06	YES	250-300-200	5.44	18.8	50	OLD	Tap Changer By Pass	Passed
182		CLIMAX	250	5847/12	NO	300-300-250	4.99	4.1	43	OLD	Tap Changer By Pass	Passed
183		CLIMAX	500	5208/11	YES	250-300-250	4.98	20	42	OLD	Tap Changer By Pass	Passed
184		PEL	50	5946/12	NO	400-500-400	3.86	3.5	39	OLD	Tap Changer By Pass	Passed
185	17-Mar-12	CLIMAX	750	5524/11		400-400-200	4.97	32.6	52	OLD	Nil	Passed Request By Im
186		SIEMENS	100	5947/12	NO	400-400-400	3.96	-13.0	42	OLD	Tap Changer By Pass	Passed
187		CLIMAX	500	5948/12	NO							Failed In High Voltage Test
188	24-Apr-12	T/PAK	500	613/02	YES	250-400-300	5.17	13.3	47	OLD	Tap Changer By Pass	Passed
189		CLIMAX	250	225/02	YES	250-250-250	4.34	3.4	53	OLD	Tap Changer By Pass	Passed
190		CLIMAX	250	5918/12	NO	300-300-200	4.99	9.9	49	OLD	Tap Changer By Pass	Passed
191		J&P	250	2227/04	YES	300-300-200	4.62	2.5	50	OLD	Tap Changer By Pass	Passed
192		J&P	250	5949/12	NO	300-400-200	4.33	-6.0	39	OLD	Tap Changer By Pass	Passed
193		CLIMAX	500	1213/03	NO	300-400-500	4.98	29.9	51	OLD	Tap Changer By Pass	Failed Due To Over Losses
194		SIEMENS	750	5950/12	NO	1000-400-400	4.88	20	43	OLD	Tap Changer By Pass	Passed
195	25-Apr-12	CLIMAX	250	4435/10	YES	400-500-300	4.8	3.9	43	OLD	Tap Changer By Pass	Passed
196		CLIMAX	250	2256/04	YES	400-500-500	4.71	8.5	52	OLD	Tap Changer By Pass	Passed
197		CLIMAX	150	5951/12	NO							Failed In High Voltage Test

198		PEL	200	5165/11	YES	250-300-200	3.81	-3.2	39	OLD	Tap Changer By Pass	Passed
199		CLIMAX	500	5948/12	YES	200-200-40	4.51	4.9	43	OLD	Tap Changer Functional	Failed In I.R Test
200		CLIMAX	250	5952/12	YES	500-1000-500	4.9	6.8	50	OLD	Tap Changer By Pass	Passed
201		SIEMENS	500	3381/07	NO	300-500-300	5.44	11.6	47	OLD	Tap Changer By Pass	Passed
202	26-Apr-12	CLIMAX	500	5953/12	NO	130-150-130	4.78	-0.3	42	OLD	Tap Changer Functional	Failed In I.R Test
203		SIEMENS	500	5954/12	NO	250-250-250	5.43	5.9	52	OLD	Tap Changer Functional	Passed
204		CLIMAX	500	1643/04	YES					OLD		Failed In High Voltage Test
205		CLIMAX	250	5955/12	NO	500-500-500	5.08	3.9	49	OLD	Tap Changer By Pass	Passed
206		CLIMAX	25	2955/06	YES	400-500-500	3.80	-22.9	51	OLD	Tap Changer By Pass	Passed
207		SIEMENS	50	5956/12	NO	300-300-200	3.84	-7.0	59	OLD	Tap Changer By Pass	Passed
208	27-Apr-12	CLIMAX	50	5226/11	YES	400-400-400	4.01	-14.5	42	NEW	Tap Changer By Pass	Passed
209		J&P	500	5960/12	NO	500-300-500	5.26	19.3	43	OLD	Tap Changer By Pass	Passed
210		J&P	500	5959/12	NO	300-500-400	6	17.3	46	OLD	Tap Changer By Pass	Failed Due To Over Impendence
211		SIEMENS	250	809/03	YES	300-300-300	4.71	2.1	51	OLD	Tap Changer By Pass	Passed
212		SIEMENS	500	5731/12	NO	250-300-300	4.23	6.5	49	OLD	Tap Changer By Pass	Passed
213		CLIMAX	50	5958/12	NO	500-800-600	3.96	-11	52	OLD	Tap Changer By Pass	Passed
214		SIEMENS	50	5957/12	NO							Failed In High Voltage Test

215	28-Apr-12	SIEMENS	50	5961/12	NO	300-300-300	4.05	-9.3	53	OLD	Tap Changer By Pass	Passed
216		PEL	200	5962/12	NO	300-300-300	4.26	-6.8	39	OLD	Tap Changer Functional	Passed
217		CLIMAX	150	5963/12	NO	300-400-300	4.35	16.7	42	OLD	Tap Changer By Pass	Passed
218		CLIMAX	150	5964/12	NO	500-500-500	4.41	24.0	38	NEW	Tap Changer By Pass	Failed Due To Over Losses
219		CLIMAX	250	2542/05	YES	500-500-500	5.08	10.8	49	NEW	Tap Changer By Pass	Passed
220		CLIMAX	250	5740/12	YES	600-600-500	4.62	11.2	40	OLD	Tap Changer By Pass	Passed
221		CLIMAX	250	2120/04	YES					NEW		Failed In Induced Test
222		PEL	500	5953/12	NO	300-300-300	4.69	1.0	53	NEW	Tap Changer By Pass	Passed
223	30-Apr-12	CLIMAX	500	496/02	YES	225-300-400	5.44	13.0	52	OLD	Tap Changer By Pass	Passed
224		J&P	500	1643/04	YES	400-400-400	4.59	-0.2	40	OLD	Tap Changer By Pass	Passed
225		CLIMAX	500	1213/03	YES	230-300-300	4.88	18.5	45	OLD	Tap Changer By Pass	Passed
226		SIEMENS	500	5967/12	NO	400-400-400	5.06	7.5	48	OLD	Tap Changer By Pass	Passed
227		SIEMENS	500	5829/12	NO	250-300-300	4.69	3.4	43	OLD	Tap Changer By Pass	Passed
228		CLIMAX	500	5948/12	NO	500-500-500	4.5	10.3	50	NEW	Tap Changer By Pass	Passed
229		PEL	750	5965/12	NO	400-400-500	4.97	20.0	42	NEW	Tap Changer Functional	Passed
230		J&P	250	5966/12	NO	300-300-200	3.98	13.0	45	OLD	Tap Changer By Pass	Passed
231		CLIMAX	250	2294/04	YES	250-250-200	4.97	0.1	38	OLD	Tap Changer By Pass	Passed
232		CLIMAX	150	5964/12	NO	600-500-600	4.34	12.9	40	OLD	Tap Changer Functional	Passed
233		CLIMAX	250	1032/03	YES	400-400-400	5.36	14.9	55	OLD	Tap Changer Functional	Passed

234		PEL	200	5968/12	NO	300-300-250	4.07	-4.7	35	OLD	Tap Changer By Pass	Passed
235		CLIMAX	150	5969/12	NO							Failed In Induced Test

Data Collection Sheet - May 2012

S.NO	Date of Inspection	Make	Rating (KVA)	TSW Sr. No.	Refur. Earlier by TSW (Yes/No)	IR Test (HT-E=220, HT-LT=220, LT-E=150) MΩ	% Impedance WAPDA 3.6 - 4.4 & KESC 4 - 5.5	Losses ≤ 15% for 250kVA & 20% for others	Dielectric Strength ≥ 30 kV	Condition Of Oil	Physical Discrepancy	Inspection result
										New/Old		
1	02-May-12	SIEMENS		2404/05	YES	400-300-400	4.07	1.9	42	OLD	Tap Changer By Pass	Passed
2		CLIMAX	150	5951/12	NO	800-800-800	4.35	23.6	38	OLD	Tap Changer Functional	Failed Due To Over Losses
3		PEL	250	5975/12	YES	500-500-500	5.1	13.1	40	OLD	Tap Changer By Pass	Passed
4		SIEMENS	500	5971/12	NO	500-500-500	4.88	7.6	46	OLD	Tap Changer Functional	Passed
5		CLIMAX	250	5972/12	NO	300-400-300	5.18	6.9	39	OLD	Tap Changer By Pass	Passed
6		PEL	250	1893/04	YES	300-300-150	5.47	18.2	49	OLD	Tap Changer Functional	Failed Due To Over Losses
7		CLIMAX	750	5970/12	NO	250-300-300	5.34	21.7	39	OLD	Tap Changer By Pass	Failed Due To Over Losses
8	03-May-12	SIEMENS	50	5113/11	YES	400-400-400	4	-5.9	40	OLD	Tap Changer By Pass	Passed
9		CLIMAX	150	2474/05	YES	500-500-500	4.33	14.2	38	OLD	Tap Changer By Pass	Passed
10		CLIMAX	150	5973/12	NO	500-500-500	4.33	5.5	48	OLD	Tap Changer By Pass	Passed
11		MML	250	746/03	YES	500-500-500	4.32	-8.2	52	OLD	Tap Changer Functional	Passed
12		CLIMAX	750	676/02	YES	300-300-250	4.88	30.6	42	OLD	Tap Changer Functional	Failed Due To High Losses
13		SIEMENS	1500	5974/12	NO	400-400-300	3.99	7.5	39	NEW	Tap Changer	Passed

											Functional	
14		PEL	250	1893/05	YES	300-400-250	4.99	12.5	52	OLD	Tap Changer By Pass	Passed
15		PEL	100	4803/10	YES	500-500-400	3.77	-12.9	54	OLD	Tap Changer By Pass	Passed
16		PEL	250	640/02	YES	300-400-250	5.08	5.2	52	OLD	Tap Changer By Pass	Failed Due To Abnormal Sound Observed During Testing
17	04-May-12	PEL	50	5796/12	NO	225-225-70	4.27	-2.1	52	OLD	Tap Changer By Pass	Failed In I.R Test
18		PEL	200	1267/03	YES	250-250-200	2.91	-24.8	51	OLD	Tap Changer By Pass	Failed Due To Low Impendence
19		CLIMAX	150	3281/07	YES	300-300-250	4.52	12.0	54	OLD	Tap Changer By Pass	Passed
20		T/PAK	250	5977/12	NO	300-300-300	5.17	1.1	38	OLD	Tap Changer Functional	Passed
21		SIEMENS	500	5358/11	YES	250-300-250	4.87	2.5	42	NEW	Tap Changer Functional	Passed
22		PEL	200	1489/03	YES	300-400-300	3.98	-6.0	43	OLD	Tap Changer By Pass	Passed
23		SIEMENS	1000	5979/12	NO	1000-1000-300	4.31	5.0	49	NEW	Tap Changer By Pass	Passed
24	05-May-12	PEL	250	4276/09	YES	0	0	0.0	0	0	Tap Changer By Pass	Failed In High Voltage Test
25		J&P	250	5978/12	NO	300-300-200	5.07	-5.6	52	OLD	Tap Changer By Pass	Passed
26		J&P	250	1457/03	YES	300-400-200	4.7	-6.1	51	OLD	Tap Changer By Pass	Passed
27		PEL	250	5980/12	NO	250-230-150	4.7	-4.8	41	OLD	Tap Changer Functional	Passed
28		T/PAK	250	2686/05	YES	500-500-500	4.9	1.7	42	NEW	Tap Changer By Pass	Passed

29		SIEMENS	500	5931/12	NO	225-300-200	5.15	-2.5	49	OLD	Tap Changer By Pass	Passed
30		CLIMAX	250	5807/12	NO	500-400-500	4.99	13.2	46.19	NEW	Tap Changer By Pass	Passed
31	07-May-12	CLIMAX	50	1690/04	YES	400-400-300	3.6	-1.3	38	OLD	Tap Changer By Pass	Passed
32		PEL	250	4276/09	YES	500-500-300	4.63	0.5	41	OLD	Tap Changer By Pass	Passed
33		PEL	250	5981/12	NO	300-250-200	4.72	-0.5	48	OLD	Tap Changer Functional	Passed
34		PEL	250	640/02	YES	300-300-200	5	5.0	52	OLD	Tap Changer By Pass	Passed
35		PEL	250	1466/03	YES	300-300-250	4.9	3.5	39	OLD	Tap Changer By Pass	Passed
36		CLIMAX	250	4147/09	YES	500-400-300	4.72	10.2	54	OLD	Tap Changer Functional	Passed
37		CLIMAX	250	64/02	YES						Tap Changer By Pass	Failed In High Voltage Test
38		CLIMAX	250	5982/12	NO	400-400-200	5.27	12.6	51	OLD	Tap Changer Functional	Passed
39		PEL	500	5983/12	NO	400-250-200	4.63	-7.0	41	OLD	Tap Changer Functional	Passed
40		CLIMAX	250	2999/06	YES	300-300-200	4.81	3.7	44	OLD	Tap Changer By Pass	Passed
41		PEL	50	5976/12	NO	400-400-400	4.09	2.6	45	OLD	Tap Changer By Pass	Passed
42	08-May-12	PEL	200	2387/05	YES	600-600-500	2.85	11.0	43	OLD	Tap Changer By Pass	Failed Due To Low Impendence
43		CLIMAX	150	5969/12	YES	600-600-500	4.54	17.9	41	OLD	Tap Changer Functional	Passed
44		CLIMAX	250	70/02	YES	600-500-500	5.08	3.4	52	OLD	Tap Changer By Pass	Passed
45	09-May-12	CLIMAX	150	5984/12	NO	500-600-500	4.67	11.7	53	OLD	Tap Changer By Pass	Passed
46		CLIMAX	250	4629/10	YES	400-400-300	4.89	3.3	43	OLD	Tap Changer By Pass	Passed

47		PEL	250	5985/12	NO	300-300-200	4.68	-21.7	51	OLD	Tap Changer By Pass	Passed
48		CLIMAX	250	64/02	YES	225-225-150	5.08	9.1	40	OLD	Tap Changer By Pass	Passed
49		SIEMENS	50	5986/12	NO	225-225-150	3.91	-13.4	49	OLD	Tap Changer By Pass	Passed
50		PEL	500	5987/12	NO	225-225-150	4.59	-9.8	52	OLD	Tap Changer Functional	Passed
51		CLIMAX	250	719/03	YES	225-300-200	4.07	9.4	56	OLD	Tap Changer Functional	Passed
52		SIEMENS	500	5988/12	NO	80-100-70	5.07	7.5	40	OLD	Tap Changer By Pass	Failed In I.R Test
53		CLIMAX	250	3205/07	YES						Tap Changer By Pass	Failed In Induced Test
54	10-May-12	CLIMAX	250	5252/11	YES	400-400-300	4.9	6.6	43	OLD	Tap Changer By Pass	Passed
55		CLIMAX	250	745/03	YES	400-400-350	4.44	6.5	52	OLD	Tap Changer Functional	Passed
56		CLIMAX	250	5212/11	YES	400-400-400	5.08	4.0	48	OLD	Tap Changer By Pass	Passed
57		CLIMAX	250	2100/04	YES	400-400-300	4.71	9.7	54	OLD	Tap Changer By Pass	Passed
58		SIEMENS	500	5988/12	NO	600-500-500	4.98	9.3	44	OLD	Tap Changer By Pass	Passed
59		SIEMENS	750	5839/12	NO	400-300-400	4.97	22.2	58	OLD	Tap Changer By Pass	Failed Due To Over Losses
60		PEL	250	3688/08	YES				38	OLD	Tap Changer By Pass	Passed
61	11-May-12	SIEMENS	50	5989/12	NO	600-600-600	3.99	-16.2	52	OLD	Tap Changer By Pass	Passed
62		CLIMAX	250	5218/11	YES	600-600-600	4.89	3.9	48	OLD	Tap Changer Functional	Passed
63		CLIMAX	250	4110/09	YES	600-600-500	5.18	15.0	38	OLD	Tap Changer By Pass	Passed
64		CLIMAX	250	2150/04	YES	500-500-500	5.45	10.1	51	OLD	Tap Changer By Pass	Passed
65		SIEMENS	500	5481/11	YES	600-600-600	4.63	9.0	49	NEW	Tap Changer By Pass	Passed

66		PEL	200	1267/03	YES							Failed In Induced Test
67		PEL	250	3688/08	YES	500-500-300	4.91	14.1	48	OLD	Tap Changer By Pass	Passed
68	12-May-12	CLIMAX	250	5990/12	NO	400-300-300	4.9	5.5	46	OLD	Tap Changer By Pass	Passed
69		SIEMENS	500	5991/12	NO	300-300-300	3.96	7.0	57	NEW	Tap Changer By Pass	Passed
70		SIEMENS	50	1979/04	YES	350-350-250	4.01	-10.3	58	NEW	Tap Changer By Pass	Passed
71		CLIMAX	150	5992/12	NO	400-400-300	4.62	11.4	52	NEW	Tap Changer By Pass	Passed
72		SIEMENS	50	5957/12	YES	400-350-250	4.03	-2.8	54	OLD	Tap Changer By Pass	Passed
73		CLIMAX	250	1362/03	YES	300-300-200	4.71	4.6	43	OLD	Tap Changer By Pass	Passed
74		CLIMAX	250	1259/03	YES	350-300-200	4.53	6.6	42	OLD	Tap Changer By Pass	Passed
75	14-May-12	CLIMAX	250	1172/03	YES	350-300-300	4.9	10.4	43	OLD	Tap Changer By Pass	Passed
76		CLIMAX	250	2325/05	YES	300-300-300	4.35	4.9	40	OLD	Tap Changer By Pass	Passed
77		CLIMAX	500	1419/03	YES	250-300-200	5.44	12.8	47	OLD	Tap Changer By Pass	Passed
78		CLIMAX	250	5994/12	NO	350-400-200	5.09	8.9	38	OLD	Tap Changer By Pass	Passed
79		SIEMENS	1000	5995/12	NO	400-350-300	5.07	15.0	42	OLD	Tap Changer Functional	Passed
80		CLIMAX	250	2160/04	YES	350-350-300	4.15	3.0	52	OLD	Tap Changer By Pass	Passed
81		CLIMAX	500	3909/09	YES	300-300-200	5.49	16.6	45	OLD	Tap Changer By Pass	Passed
82		SIEMENS	1000	5810/12	YES	400-400-200	4.81	30.0	40	NEW	Tap Changer By Pass	Failed Due To Over Losses
83		CLIMAX	50	5993/12	NO							Failed In Induced Test
84		CLIMAX	250	2249/04	YES							Failed In

												Induced Test
85		CLIMAX	250	2387/05	YES							Failed In Induced Test
86		CLIMAX	250	2431/05	YES							Failed In High Voltage Test
87	15-May-12	CLIMAX	250	1036/03	YES	400-350-200	4.7	7.0	48	OLD	Tap Changer By Pass	Passed
88		CLIMAX	500	3212/02	YES	350-300-170	5.44	18.2	52	OLD	Tap Changer By Pass	Passed
89		CLIMAX	500	5996/12	NO	250-300-200	3.86	1.8	40	OLD	Tap Changer Functional	Passed
90		CLIMAX	500	347/03	YES	350-350-350	5.44	16.2	45	OLD	Tap Changer By Pass	Passed
91		T/PAK	250	5695/11	YES							Failed In High Voltage Test
92		SIEMENS	500	5997/12	NO	300-200-300	4.88	5.1	55	NEW	Tap Changer By Pass	Passed
93		T/PAK	250	5998/12	NO	350-300-300	4.53	11.8	50	NEW	Tap Changer Functional	Passed
94	16-May-12	PEL	250	5999/12	NO	300-400-300	4.61	-2.2	50		Tap Changer Functional	Passed
95		CLIMAX	250	2120/04	YES	250-300-250	4.52	3.7	53		Tap Changer By Pass	Passed
96		CLIMAX	250	6000/12	NO							Failed In Induced Test
97		CLIMAX	500	2597/05	YES	300-300-250	5.49	14.1	43		Tap Changer By Pass	Passed
98		ELMETEC	250	6001/12	NO	250-250-200	5.27	2.2	38		Tap Changer Functional	Passed
99		CLIMAX	250	2431/05	YES	300-300-230	4.80	1.5	41		Tap Changer By Pass	Passed
100		PEL	200	1267/03	YES							Failed In Induced

												Test
101		CLIMAX	250	3042/06	YES	270-300-200	4.43	2.9	37		Tap Changer By Pass	Passed
102	17-May-12	SIEMENS	500	6002/12	NO	300-400-300	5.26	15.7	42	NEW	Tap Changer By Pass	Passed
103		CLIMAX	250	5298/11	YES	250-300-250	4.8	2.7	38	OLD	Tap Changer By Pass	Passed
104		CLIMAX	250	3205/07	YES	250-300-200	5.18	16.6	43	OLD	Tap Changer By Pass	Passed
105		CLIMAX	500	446/02	YES	300-300-250	5.44	17.1	53	OLD	Tap Changer By Pass	Passed
106		CLIMAX	250	2821/05	YES	250-250-200	5.54	-1.8	46	OLD	Tap Changer By Pass	Passed
107		CLIMAX	250	3511/08	YES	300-300-230	4.80	-1.6	39	OLD	Tap Changer By Pass	Passed
108		CLIMAX	250	6003/12	NO	250-300-200	5	14.5	39	OLD	Tap Changer By Pass	Passed
109		T/PAK	250	5695/11	YES	270-300-200	4.9	-2.9	41	OLD	Tap Changer By Pass	Passed
110	18-May-12	CLIMAX	250	3690/08	YES	400-400-300	4.69	-10.7	40	OLD	Tap Changer By Pass	Passed
111		CLIMAX	250	3350/08	YES							Failed In Induced Test
112		CLIMAX	250	5595/11	YES	350-350-250	4.11	4.9	53	OLD	Tap Changer By Pass	Passed
113		T/PAK	250	5422/11	YES	400-400-400	4.82	6.5	53	OLD	Tap Changer By Pass	Passed
114		PEL	250	6004/12	NO	300-300-200	4.71	1.0	43	OLD	Tap Changer Functional	Passed
115		PEL	200	6005/12	NO	300-300-300	3.78	-11.2	41	OLD	Tap Changer By Pass	Passed
116		SIEMENS	500	172/02	YES	350-250-200	5.07	15.8	38	OLD	Tap Changer By Pass	Passed
117	19-May-12	CLIMAX	250	2230/04	YES	230-250-200	5.17	306.0	40		Tap Changer By Pass	Passed
118		CLIMAX	250	1102/03	YES	400-400-300	4.53	906.0	43		Tap Changer By Pass	Passed
119		CLIMAX	250	5530/11	YES	350-350-350	4.71	307.0	53		Tap Changer By Pass	Passed

120		T/PAK	500	3381/07	YES	350-300-350	5.07	13.3	53		Tap Changer By Pass	Passed
121		PEL	500	6006/12	NO	300-300-300	4.87	-4.4	43		Tap Changer Functional	Passed
122			250	6007/12	NO	400-300-200	5.09	10.1	41		Tap Changer Functional	Passed
123		PEL	25	6008/12	NO	300-200-200	4.35	-8.9	38		Tap Changer By Pass	Passed
124		SIEMENS	500	6009/12	NO							Failed In High Voltage Test
125	21-May-12	CLIMAX	250	2257/04	YES	250-250-150	4.72	8.0	41	OLD	Tap Changer By Pass	Passed
126		PEL	250	949/03	YES	250-225-200	4.99	1.2	49	OLD	Tap Changer By Pass	Passed
127		CLIMAX	250	1163/03	YES	220-220-190	4.99	2.8	42	OLD	Inspection Hole Plate Not Painted	Passed
128		CLIMAX	500	6009/12	YES	300-250-200	4.33	4.0	48	OLD	Tap Changer Operative	Passed
129		PEL	500	6010/12	NO	250-250-200	4.88	2.1	50	OLD	Tap Changer Bypassed	Passed
130		CLIMAX	250	2746/05	YES	400-400-300	4.71	0.4	39	OLD	Tap Changer Bypassed	Passed
131		T-PAK	500	3531/08	YES	500-450-400	5.36	5.4	43	OLD	Tap Changer By Pass	Passed
132		CLIMAX	150	1498/03	YES	300-300-200	4.35	13.1	38	OLD	Tap Changer By Pass	Passed
133		PEL	250	2403/05	YES	250-250-200	4.33	6.2	52	OLD	Tap Changer By Pass	Passed
134		CLIMAX	500	4887/10	YES	400-450-400	4.82	22.3	57	OLD	Tap Changer Bypassed	Failed Due To Higher Total Losses
135		CLIMAX	250	3313/07	YES	300-300-250	4.71	1.3	40	OLD	Tap Changer Bypassed	Passed
136		CLIMAX	250	2249/04	YES	250-300-200	4.35	6.9	43	OLD	Tap Changer By Pass	Passed
137	22-May-12	J&P	250	6011/12	NO	500-500-400	4.15	-4.3	57	OLD	Tap Changer	Passed

											By Pass	
138		CLIMAX	250	560/02	YES				40	OLD	Tap Changer By Pass	Failed In Induced Test
139		CLIMAX	250	472/02	YES	400-400-400	4.89	-1.0	39	OLD	Inspection Hole Plate Not Painted	Passed
140		SIEMENS	500	251/02	YES				43	OLD	Tap Changer Operative	Failed In Induced Test
141		CLIMAX	250	23	NO	400-400-300	4.61	10.1	52	OLD	Tap Changer Bypassed	PASSED
142		SIEMENS	500	5417/11	YES	300-300-160	4.6	9.0	53	OLD	Tap Changer Bypassed	PASSED
143		SIEMENS	500	6012/12	NO	400-300-300	5.34	10.9	42	OLD	Tap Changer By Pass	Passed
144		CLIMAX	500	4887/10	YES	500-500-500	4.89	16.5	48	OLD	Tap Changer By Pass	Passed
145		CLIMAX	500	5108/10	YES	600-600-600	5.53	14.9	51	NEW	Tap Changer By Pass	Passed
146		SIEMENS	25	6013/12	NO				59	NEW	Tap Changer By Pass	Failed In High Voltage Test
147	23-May-12	SIEMENS	25	6013/12	YES	400-350-300	3.82	-16.6	59	NEW	Tap Changer By Pass	Passed
148		J&P	250	4917/10	YES	600-300-300	4.24	-7.5	52	NEW	Tap Changer By Pass	Passed
149		J&P	250	6014/12	NO	300-300-250	4.44	9.2	41	OLD	Tap Changer By Pass	Passed
150		CLIMAX	250	6015/12	NO							Failed In 2kv Test
151		SIEMENS	500	6016/12	NO	500-500-400	4.98	17.5	48	NEW	Tap Changer By Pass	Passed
152		CLIMAX	250	6017/12	NO	400-350-350	4.62	7.1	51	NEW	Tap Changer By Pass	Passed
153		PEL	250	340/02	YES	350-200-300	5.00	14.8	40	NEW	Tap Changer By Pass	Passed
154		PEL	250	6018/12	NO	350-300-300	4.82	13.9	52	NEW	Tap Changer By Pass	Passed

155		MML	250	6019/12	NO	400-300-300	4.33	-8.0	38	OLD	Tap Changer By Pass	Passed
156		J&P	250	6020/12	NO	300-300-200	4.9	7.7	54	NEW	Tap Changer By Pass	Passed
157		J&P	250	6021/12	NO	300-350-300	3.78	8.0	44	OLD	Tap Changer By Pass	Passed
158	24-May-12	PEL	250	1235/03	YES	350-350-300	4.54	12.9	50	OLD	Tap Changer By Pass	Passed
159		J&P	250	6022/12	NO	300-300-300	4.43	3.7	46	OLD	Tap Changer Functional	Passed
160		PEL	250	6023/12	NO							Failed In Induced Test
161		T/PAK	500	3539/08	YES	350-250-250	4.98	13.6	52	NEW	Tap Changer By Pass	Passed
162		PEL	200	6024/12	NO					NEW		Failed In Induced Test
163		PEL	250	331/02	YES	350-350-250	4.13	8.2	43	NEW	Tap Changer By Pass	Passed
164		PEL	500	1577/04	YES	400-400-400	4.6	0.8	49	NEW	Tap Changer By Pass	Passed
165	25-May-12	CLIMAX	1000	2169/05	YES		6.02	54.4	50	NEW		Failed Due To Over Losses & Impendence
166		CLIMAX	150	6025/12	NO	400-350-350	4.45	17.8	59	OLD	Tap Changer By Pass	Passed
167		SIEMENS	250	4117/09	YES	400-400-200	4.98	-1.8	55	OLD	Tap Changer By Pass	Passed
168		CLIMAX	250	3084/06	YES	350-250-300	4.70	-1.9	52	OLD	Tap Changer By Pass	Passed
169		CLIMAX	250	6026/12	NO	300-350-300	4.89	4.0	57	OLD	Tap Changer By Pass	Passed
170		CLIMAX	250	3078/06	YES	300-300-300	4.15	-0.8	53	OLD	Tap Changer By Pass	Passed
171	26-May-12	CLIMAX	250	5173/11	YES	400-400-350	4.34	3.3	55	OLD	Tap Changer By Pass	Passed
172		PEL	250	5280/11	YES	300-400-250	4.63	4.9	49	OLD	Tap Changer	Passed

											By Pass	
173		J&P	250	6027/12	NO	300-300-250	4.97	-8.1	49	NEW	Tap Changer By Pass	Passed
174		J&P	250	6028/12	NO							Failed In High Voltage Test
175		SIEMENS	500	5297/11	YES	400-400-350	4.88	5.1	53	NEW	Tap Changer By Pass	Passed
176		CLIMAX	250	5934/12	YES							Failed In Induced Test
177		CLIMAX	250	1112/03	YES	400-400-350	4.98	-1.4	47	NEW	Tap Changer By Pass	Passed
178	28-May-12	PEL	250	6029/12	NO	400-400-400	4.71	-0.8	50	OLD	Tap Changer Functional	Passed
179		PEL	250	2006/04	YES	300-400-300	5.18	8.1	49	OLD	Tap Changer By Pass	Passed
180		CLIMAX	500	6030/12	NO	400-400-300	4.2	9.3	53	NEW	Tap Changer By Pass	Passed
181		J&P	250	6031/12	NO	300-300-300	4.97	-10.2	47	OLD	Tap Changer By Pass	Passed
182		CLIMAX	50	6032/12	NO	400-300-400	4.35	22.0	55	NEW	Tap Changer By Pass	Failed Due To Over Losses
183		PEL	250	1484/03	YES	400-400-350	5.08	9.0	56	NEW	Tap Changer By Pass	Passed
184		CLIMAX	50	6033/12	NO	400-400-350	4.23	6.9	55	NEW	Tap Changer By Pass	Passed
185		PEL	250	6034/12	NO	400-400-300	4.7	-3.0	58	NEW	Tap Changer By Pass	Passed
186		PEL	250	5006/10	YES	350-300-250	5.18	2.4	55	OLD	Tap Changer By Pass	Passed
187		SIEMENS	500	3671/08	YES	400-400-60	5.07	7.6	49	OLD	Tap Changer By Pass	Failed In I.R Test
188		CLIMAX	250	6035/12	NO	400-400-300	4.62	13.3	53	OLD	Tap Changer By Pass	Passed
189		CLIMAX	50	6036/12	NO	400-400-350	4.41	9.9	51	OLD	Tap Changer By Pass	Passed
190		PEL	250	1921/04	YES	400-400-300	4.8	-4.8	48	NEW	Tap Changer	Passed

											By Pass	
191		PEL	250	6037/12	NO	400-400-400	4.8	0.0	47	OLD	Tap Changer Functional	Passed
192		PEL	250	6038/12	NO	400-350-350	4.71	-2.6	53	NEW	Tap Changer Functional	Passed
193		PEL	250	6039/12	NO	400-400-400	4.71	-4.2	53	NEW	Tap Changer Functional	Passed
194	29-May-12	PEL	250	256/02	YES	400-400-350	4.73	13.9	50	OLD	Tap Changer By Pass	Passed
195		T/PAK	250	2050/04	YES	400-500-170	5.1	14.9	57	OLD	Tap Changer By Pass	Passed
196		CLIMAX	500	5954/12	YES							Failed In Induced Test
197		PEL	250	6040/12	NO	400-300-300	4.01	11.8	49	OLD	Tap Changer By Pass	Passed
198		PEL	250	6041/12	NO	400-400-400	4.75	3.7	43	OLD	Tap Changer By Pass	Passed
199		CLIMAX	50	6042/12	NO	400-500-160	3.96	15.5	59	OLD	Tap Changer Functional	Passed
200		CLIMAX	150	1699/04	YES	400-400-300	4.42	12.6	45	OLD	Tap Changer By Pass	Passed
201		J&P	250	109/02	YES							Failed In Induced Test
202		CLIMAX	250	4924/10	YES							Failed In High Voltage Test
203	30-May-12	CLIMAX	250	5629/11	YES	300-300-300	5.06	11.9	58	NEW	Tap Changer By Pass	Passed
204		CLIMAX	250	1717/04	YES	300-350-300	4.91	8.7	60	NEW	Tap Changer By Pass	Passed
205		CLIMAX	250	6047/12	NO	400-350-300	5.18	12.6	53	NEW	Tap Changer By Pass	Passed
206		T/POWER	250	6023/12	YES	250-300-300	5.39	31.0	53	NEW	Tap Changer By Pass	Failed Due To Over Losses
207		PEL	500	6046/12	NO	300-300-175	5.5	20.0	55	NEW	Tap Changer By Pass	Passed

208		PEL	250	5483/11	YES	250-300-250	4.2	5.7	43	OLD	Tap Changer By Pass	Passed
209		CLIMAX	250	5300/11	YES	350-350-250	4.81	3.1	55	NEW	Tap Changer By Pass	Passed
210		PEL	750	6043/12	NO	300-300-200	4.71	44.3	56	NEW	Tap Changer By Pass	Failed Due To Over Losses
211		PEL	25	6044/12	NO	350-250-150	3.92	-17.7	36	OLD	Tap Changer By Pass	Passed
212		CLIMAX	150	5951/12	YES	350-200-200	3.96	11.9	52	NEW	Tap Changer Functional	Passed
213	31-May-12	CLIMAX	250	560/02	YES	300-250-175	4.8	11.0	43	OLD	Tap Changer By Pass	Passed
214		SIEMENS	250	2742/05	YES	300-300-160	4.98	-0.3	39	OLD	Tap Changer By Pass	Passed
215		CLIMAX	250	6000/12	YES	350-300-200	4.95	13.1	37	OLD	Tap Changer By Pass	Passed
216		CLIMAX	250	6045/12	NO	300-275-175	5.22	14.8	57	NEW	Tap Changer By Pass	Passed
217		CLIMAX	250	1344/03	YES	250-275-200	4.73	6.6	40	OLD	Tap Changer By Pass	Passed
218		T/PAK	50	6032/12	YES	300-300-250	4.35	19.4	39	OLD	Tap Changer Functional	Passed
219		T/PAK	250	942/03	YES	300-300-160	4.74	9.1	41	OLD	Tap Changer By Pass	Passed
220		T/PAK	250	3715/08	YES							Failed In High Voltage Test
221		T/PAK	500	1001/03	YES	275-300-180	5.21	14.5	59	NEW	Tap Changer By Pass	Passed
222		PEL	500	6048/12	NO	300-250-160	4.67	1.7	53	NEW	Tap Changer Functional	Passed
223		PEL	500	6049/12	NO	250-300-170	4.9	14.5	59	NEW	Tap Changer Functional	Passed
224		CLIMAX	250	5301/11	YES							Failed In High Voltage Test

Data Collection Sheet - June 2012

S. No.	Date of Inspection	Make	Rating (KVA)	TSW Sr. No.	Refur. Earlier by TSW (Yes/No)	IR Test (HT-E=220, HT-LT=220, LT-E=150) MΩ	% Impedance WAPDA 3.6 - 4.4 & KESC 4 - 5.5	Losses ≤ 15% for 250kVA & 20% for others	Dielectric Strength ≥ 30 kV	Condition Of Oil	Physical Discrepancy	Inspection result
										New/Old		
1	01-Jun-12	PEL	250	6050/12	NO	250-250-200	4.23	14.4	55	NEW	Tap Changer Functional	Passed
2		CLIMAX	250	3660/08	YES	300-280-250	5.08	11.5	52	NEW	Tap Changer By Pass	Passed
3		CLIMAX	250	3566/08	YES	300-250-200	5.04	14.2	56	NEW	Tap Changer By Pass	Passed
4		T/PAK	250	3715/08	YES	250-300-200	5.03	-2.8	55	NEW	Tap Changer By Pass	Passed
5		T/PAK	250	204/02	YES							Failed In Induced Test
6		CLIMAX	250	2517/05	YES	250-250-200	5.02	11.7	42	OLD	Tap Changer By Pass	Passed
7		CLIMAX	500	1213/03	YES	250-300-170	5.29	28.5	39	OLD	Tap Changer By Pass	Failed Due To Over Losses
8	02-Jun-12	CLIMAX	250	5301/11	YES	300-300-250	5.02	9.5	52	NEW	Tap Changer By Pass	Passed
9		CLIMAX	250	6051/12	NO	300-250-200	4.55	4.9	43	OLD	Tap Changer By Pass	Passed
10		T/PAK	250	1803/04	YES	300-300-250	5	-0.3	40	OLD	Tap Changer By Pass	Passed
11		SIEMENS	500	6052/12	NO	250-300-200	5.44	13.1	39	OLD	Tap Changer Functional	Passed
12		SIEMENS	500	5358/11	YES	300-300-250	4.87	13.9	57	NEW	Tap Changer By Pass	Passed
13		SIEMENS	250	2744/05	YES	250-300-200	4.86	-1.1	50	NEW	Tap Changer By Pass	Passed
14		PEL	500	2830/05	YES	300-300-200	4.7	5.0	59	NEW	Tap Changer By Pass	Passed

15		J&P	500	2141/04	YES						Tap Changer By Pass	Failed In High Voltage Test
16		T/POWER	500	6053/12	YES							Failed In Induced Test
17		CLIMAX	500	1213/03	YES							Failed In High Voltage Test
18		SIEMENS	250	4295/09	YES	350-250-180	5.21	-2.80	55	NEW	Tap Changer By Pass	Passed
19		CLIMAX	250	4924/10	YES							Failed In High Voltage Test
20		SIEMENS	250	6054/12	YES	350-300-70	5.00	6.70				Failed In IR
21		PEL	250	4130/09	YES	250-250-170	4.90	2.20	42	OLD	Tap Changer By Pass	Passed
22	04-Jun-12	J&P	500	2141/04	YES							Failed In High Voltage Test
23		PEL	250	5238/11	YES	350-350-250	4.57	14.7	52	NEW	Tap Changer By Pass	Passed
24		SIEMENS	500	3671/08	YES	350-300-250	4.93	12.3	58	NEW	Tap Changer By Pass	Passed
25		CLIMAX	250	929/03	YES	280-250-160	5.08	7.9	41	OLD	Tap Changer By Pass	Passed
26		PEL	200	2387/05	YES	350-350-200	4.10	-3.8	57	NEW	Tap Changer By Pass	Passed
27		CLIMAX	250	3550/08	YES	300-350-300	5.22	11.40	46	OLD	Tap Changer By Pass	Passed
28		PEL	250	3132/06	YES	300-300-220	4.93	5.80	60	NEW	Tap Changer By Pass	Passed
29		J&P	750	6055/12	YES	400-350-300	4.80	11.9	54	NEW	Tap Changer By Pass	Passed
30	05-Jun-12	J&P	500	2141/04		300-250-200	4.99	16.20	46	NEW	Tap Changer	Passed

											By Pass	
31		SIEMENS	250	6054/12		350-250-250	4.95	6.00	55	NEW	Tap Changer Functional	Passed
32		CLIMAX	250	6056/12		300-250-200	4.86	2.00	47	OLD	Tap Changer By Pass	Passed
33		CLIMAX	250	5993/12		300-250-250	4.89	12.9	51	OLD	Tap Changer By Pass	Passed
34		CLIMAX	250	1536/04		350-250-200	4.89	15	42	OLD	Tap Changer By Pass	Passed
35		CLIMAX	150	6057/12			4.25	28.7	58			Failed Due To Over Losses
36		J&P	250	6058/12		300-300-250	4.60	3	39	OLD	Tap Changer By Pass	Passed
37		CLIMAX	150	2448/05			3.47	35.50	47			Failed Due To Over Losses
38		CLIMAX	500	3138/06								Failed In Induced Test
39		CLIMAX	250	2367/05								Failed In Induced Test
40	06-Jun-12	PEL	250	6059/12	NO	250-200-200	4.83	9.20	49	OLD	Tap Changer By Pass	Passed
41		CLIMAX	500	5959/12	YES	300-250-200	5.87	19.80	51	OLD	Tap Changer By Pass	Failed Due To Over Impendence
42		SIEMENS	500	251/02	YES	250-300-250	4.59	12.2	42	OLD	Tap Changer By Pass	Passed
43		CLIMAX	500	5954/12	YES	300-350-250	5.49	19.9	38	OLD	Tap Changer By Pass	Passed
44		CLIMAX	500	1213/03	YES							Failed In Induced Test
45		PEL	150	6060/12	NO	250-300-200	4.42	1.60	48	OLD	Tap Changer Functional	Passed
46		T/PAK	1000	6061/12	NO	400-300-150	4.95	4.70	41	OLD	Tap Changer By Pass	Passed

47		CLIMAX	250	5275/11	YES	300-350-200	4.35	6.8	47	OLD	Tap Changer By Pass	Passed
48	07-Jun-12	CLIMAX	150	1679/04	YES		3.24	27.00				Failed Due To Low Impendence & Over Losses
49		CLIMAX	250	6062/12	YES	300-300-250	4.69	12.00	59	NEW	Tap Changer Functional	Passed
50		CLIMAX	250	1707/04	YES	300-250-200	4.63	1.6	51	OLD	Tap Changer By Pass	Passed
51		J&P	250	5157/11	YES	300-300-250	4.77	-2.8	42	OLD	Tap Changer By Pass	Passed
52		CLIMAX	250	5603/11	YES	250-300-200	4.69	14.9	43	OLD	Tap Changer Functional	Passed
53		CLIMAX	250	1488/03	YES							Failed In High Voltage Test
54		J&P	250	6028/12	YES							Failed In High Voltage Test
55		J&P	500	4531/10	YES							Failed In High Voltage Test
56	08-Jun-12	CLIMAX	250	5581/11	YES	300-300-200	5.23	7.20	43	OLD	Tap Changer By Pass	Passed
57		PEL	250	5985/12	YES	300-250-200	4.55	0.50	55	NEW	Tap Changer By Pass	Passed
58		J&P	250	2125/04	YES	350-350-150	4.52	3.9	55	NEW	Tap Changer By Pass	Passed
59		J&P	250	6063/12	NO	300-300-250	5.06	-3.1	52	NEW	Tap Changer By Pass	Passed
60		PEL	50	4991/10	YES							Failed In Induced Test
61		CLIMAX	250	1488/03	YES	350-300-250	5.00	10.30	47	OLD	Tap Changer By Pass	Passed

62		J&P	250	6028/12	YES	300-350-250	4.40	9.20	55	NEW	Tap Changer Functional	Passed
63		CLIMAX	500	3909/09	YES							Failed In 2kv Test
64		J&P	500	4531/10	YES	350-300-200	5.06	19.9	56	NEW	Tap Changer By Pass	Passed
65	09-Jun-12	T/POWER	250	6064/12	NO	300-300-200	5.28	-2.20	50	NEW	Tap Changer By Pass	Passed
66		CLIMAX	250	6065/12	NO	250-250-200	4.88	2.30	55	NEW	Tap Changer By Pass	Passed
67		CLIMAX	250	4924/10	YES	250-300-200	4.87	7.5	54	NEW	Tap Changer By Pass	Passed
68		PEL	200	6024/12	YES	300-350-250	3.86	-11.1	42	OLD	Tap Changer By Pass	Passed
69		CLIMAX	150	4649/10	YES	250-250-200	4.43	28.2	46	OLD	Tap Changer By Pass	Failed Due To Over Losses
70		PEL	250	6066/12	NO	300-300-200	4.58	-2.00	50	NEW	Tap Changer Functional	Passed
71		PEL	50	2058/04	YES	300-350-250	3.65	8.40	53	NEW	Tap Changer By Pass	Passed
72		CLIMAX	150	5228/11	YES	300-300-250	4.52	38.70	59	NEW	Tap Changer By Pass	Failed Due To Over Losses
73		PEL	250	3493/08	YES	250-300-250	4.34	12.0	57	NEW	Tap Changer By Pass	Passed
74	11-Jun-12	J&P	250	109/02	NO	250-250-200	4.55	-1.90	53	NEW	Tap Changer By Pass	Passed
75		CLIMAX	150	2453/05	YES	300-350-250	4.40	20.00	56	NEW	Tap Changer By Pass	Passed
76		PEL	250	6067/12	NO	350-350-250	4.57	8.40	55	NEW	Tap Changer By Pass	Passed
77		PEL	250	4603/10	YES	300-300-250	4.89	5.70	50	NEW	Tap Changer By Pass	Passed
78		PEL	250	5004/10	YES	350-300-200	4.61	3.20	55	NEW	Tap Changer Functional	Passed
79		T/POWER	250	6068/12	NO	300-350-220	5.27	4.3	51	NEW	Tap Changer By Pass	Passed
80		CLIMAX	250	3465/08	YES	250-300-200	4.86	5.69	52	NEW	Tap Changer By Pass	Passed

81		CLIMAX	250	5816/12	YES	300-250-220	5.31	8.8	59	NEW	Tap Changer By Pass	Passed
82		PEL	250	6069/12	NO	250-250-200	4.12	8.40	53	NEW	Tap Changer Functional	Passed
83		PEL	250	2367/05	YES	300-350-250	4.99	1.10	59	NEW	Tap Changer By Pass	Passed
84		CLIMAX	500	5522/11	YES	350-300-220	5.17	22.50	55	NEW	Tap Changer Functional	Failed Due To Over Losses
85		J&P	250	6070/12	NO	300-350-200	4.74	-4.1	59	NEW	Tap Changer By Pass	Passed
86	12-Jun-12	T/PAK	250	204/02	YES	350-350-300	4.93	7.50	53	NEW	Tap Changer By Pass	Passed
87		CLIMAX	250	4308/09	YES	400-350-350	4.08	18.70	59	NEW	Tap Changer By Pass	Failed Due To Over Losses
88		CLIMAX	250	1258/03	YES	400-400-350	4.40	13.50	54	NEW	Tap Changer By Pass	Passed
89		PEL	250	6071/12	NO	300-300-250	4.95	10.80	57	NEW	Tap Changer By Pass	Passed
90		CLIMAX	750	6043/12	YES	350-350-300	4.76	17.50	55	NEW	Tap Changer By Pass	Passed
91		CLIMAX	250	4509/10	YES	450-400-300	4.98	7.5	54	NEW	Tap Changer By Pass	Passed
92		T/PAK	250	3338/07	YES	400-350-350	4.74	4.1	55	NEW	Tap Changer By Pass	Passed
93		PEL	100	6072/12	NO	350-300-250	4.53	3.5	52	NEW	Tap Changer Functional	Passed
94	13-Jun-12	MML	250	5779/12	YES	350-300-300	4.68	-1.20	51	OLD	By Pass	Passed
95		CLIMAX	250	2309/05	YES	400-350-350	4.61	11.90	41	OLD	By Pass	Passed
96		PEL	250	4955/10	YES	350-300-300	4.82	9.50	50	OLD	By Pass	Passed
97		CLIMAX	250	5519/11	YES	450-400-350	4.85	2.80	44	OLD	By Pass	Passed
98		CLIMAX	250	5515/11	YES	400-350-300	5.16	12.50	42	OLD	By Pass	Passed
99		CLIMAX	150	6057/12	YES	450-300-300	4.21	18.9	41	OLD	Functional	PASSED
100		T/POWER	500	6053/12	YES							Failed In High Voltage Test
101		CLIMAX	500	3909/09	YES	350-300-250	5.57	18.3	59	NEW	By Pass	Passed
102		CLIMAX	250	3632/08	YES	300-250-250	5.08	13.8	48	OLD	By Pass	Passed

103		CLIMAX	250	5914/12	YES	300-350-250	4.58	-5.02	41	OLD	By Pass	Passed
104		CLIMAX	250	5586/11	YES	300-350-250	4.72	-4.89	47	OLD	By Pass	Passed
105		T/POWER	500	6073/12	NO							Failed In High Voltage Test
106	14-Jun-12	PEL	250	541/02	YES	250-300-200	4.84	-2.74	39	OLD	By Pass	Passed
107		PEL	50	4991/10	YES	300-300-250	3.95	-25.83	50	OLD	By Pass	Passed
108		T/POWER	500	6053/12	YES	300-350-250	5.12	-10.12	56	NEW	Functional	Passed
109		CLIMAX	250	6015/12	YES	300-350-60	4.30	-7.42	48	OLD	By Pass	Failed In I.R Test
110		SIEMENS	500	1917/04	YES	350-350-300	4.78	-2.08	41	OLD	By Pass	Passed
111		CLIMAX	500	5522/11	YES	450-400-400	5.11	15.6	52	OLD	Functional	Passed
112		CLIMAX	500	445/02	YES	300-350-250	5.89	7.75	38	OLD	By Pass	Passed
113		SIEMENS	750	6074/12	NO	300-300-200	5.06	8.09	42	OLD	Functional	Passed
114		PEL	250	5279/11	YES	250-300-220	4.40	-5.19	43	OLD	By Pass	Passed
115		CLIMAX	250	5657/11	YES	250-300-200	4.58	-3.84	47	OLD	By Pass	Passed
116	15-Jun-12	CLIMAX	250	3236/07	YES	300-350-300	4.72	-5.53	39	OLD	By Pass	Passed
117		PEL	250	791/03	YES	250-300-200	4.13	3.53	41	OLD	By Pass	Passed
118		CLIMAX	250	3765/08	YES	300-350-250	5.10	-3.36	40	OLD	By Pass	Passed
119		SIEMENS	500	4786/10	YES	250-300-150	4.44	-4.26	43	OLD	By Pass	Passed
120		CLIMAX	150	4649/10	YES	250-250-200	4.32	19.6	43	OLD	By Pass	Passed
121		T/POWER	500	6073/12	YES	400-400-350	5.09	-8.06	57	NEW	Functional	Passed
122		CLIMAX	250	356/02	YES	450-450-400	4.64	0.51	55	NEW	By Pass	Passed
123		CLIMAX	500	604/02	YES	450-450-400	5.99	13.89	50	NEW	By Pass	Passed
124		J&P	250	1461/03	YES							Failed In Induced Test
125	16-Jun-12	CLIMAX	250	2396/05	YES	400-450-350	4.95	-2.99	60	NEW	By Pass	Passed
126		SIEMENS	1000	5810/12	YES	400-400-350	4.57	19.86	43	NEW	By Pass	Passed
127		CLIMAX	150	1679/04	YES	450-450-400	3.92	19.33	51	NEW	By Pass	Passed
128		CLIMAX	250	4308/09	YES	400-400-350	3.95	9.01	53	NEW	By Pass	Passed
129		MML	250	6075/12	NO	450-450-400	4.52	-8.35	61	NEW	By Pass	Passed
130		CLIMAX	250	6076/12	NO	400-400-350	5.04	6.1	58	NEW	Functional	Passed
131		CLIMAX	250	6015/12	YES	350-350-300	4.34	-7.36	56	NEW	By Pass	Passed
132		CLIMAX	250	6077/12	NO	300-300-250	4.45	1.05	52	NEW	By Pass	Passed
133	18-Jun-12	CLIMAX	250	6078/12	NO	400-450-350	4.96	5.12	59	NEW	Functional	Passed
134		PEL	200	961/03	YES	450-450-400	4.41	-10.18	50	NEW	By Pass	Passed
135		PEL	200	1267/05	YES	400-400-350	4.20	-9.96	53	NEW	By Pass	Passed

136		CLIMAX	250	5934/12	YES	350-350-300	5.15	-4.11	56	NEW	By Pass	Passed
137		CLIMAX	250	6079/12	NO	400-400-350	4.67	-5.24	57	NEW	By Pass	Passed
138		CLIMAX	150	1396/04	YES	350-300-250	4.52	14.12	61	NEW	By Pass	Passed
139		J&P	500	6080/12	NO	450-450-400	4.64	-5.69	48	NEW	Functional	Passed
140		T/PAK	250	170/02	YES	400-400-350	4.82	-8.41	56	NEW	By Pass	Passed
141		CLIMAX	500	6082/12	YES	450-450-400	4.49	2.35	59	NEW	By Pass	Passed
142		CLIMAX	500	3138/06	YES	350-350-300	5.69	24.5	49	NEW	By Pass	Failed Due To Over Losses
143		SIEMENS	500	4558/10	YES	450-450-400	5.27	11.79	52	NEW	By Pass	Passed
144		CLIMAX	250	1158/03	YES	450-400-400	4.25	10.67	50	NEW	Functional	Passed
145		SIEMENS	1000	6081/12	NO	450-450-400	5.13	32.4	60	NEW	By Pass	Failed Due To Over Losses
146	19-Jun-12	PEL	250	6083/12	NO	350-350-300	4.14	5.54	58	NEW	By Pass	Passed
147		PEL	250	6084/12	NO	300-300-250	4.52	-1.42	53	NEW	By Pass	Passed
148		PEL	250	1214/03	YES	400-400-350	4.86	4.76	57	NEW	Functional	Passed
149		CLIMAX	250	2797/05	YES	350-300-300	4.73	0.94	59	NEW	By Pass	Passed
150		PEL	250	4920/10	YES	400-400-350	4.52	-2.91	56	NEW	By Pass	Passed
151		CLIMAX	250	2454/05	YES	350-350-300	4.54	3.37	56	NEW	By Pass	Passed
152		CLIMAX	150	2448/05	YES	350-300-250	3.66	19.23	54	NEW	By Pass	Passed
153		J&P	500	6085/12	NO	400-400-350	5.36	2.24	54	NEW	Functional	Passed
154		CLIMAX	500	1213/03	YES	350-350-300	5.85	12.73	57	NEW	By Pass	Passed
155		CLIMAX	1000	1183/03	YES	200-200-100	5.35	31.51	58	NEW	By Pass	Failed Due To Over Losses & I.R Test
156	20-Jun-12	SIEMENS	500	5725/12	YES	350-350-300	4.58	14.23	46	Regenerated	Functional	Passed
157		CLIMAX	250	6086/12	NO	400-400-350	4.65	9.00	48	Regenerated	Functional	Passed
158		SIEMENS	500	6088/12	NO	450-450-400	4.88	1.77	49	Regenerated	By Pass	Passed
159		CLIMAX	250	6087/12	NO	450-450-400	4.85	-4.02	52	Regenerated	By Pass	Passed
160		CLIMAX	250	4416/10	YES	450-450-400	4.99	6.86	42	Regenerated	Functional	Passed
161		CLIMAX	250	1329/03	YES							Failed In High Voltage Test
162		CLIMAX	250	583/02	YES	450-400-400	5.91	6.84	50	Regenerated	Functional	Passed
163		PEL	250	3591/08	YES	450-400-400	4.44	-0.52	42	Regenerated	By Pass	Passed
164		PEL	250	6023/12	YES	400-400-350	5.07	14.87	57	NEW	Functional	Passed
165	21-Jun-12	CLIMAX	250	3179/07	YES	450-450-400	4.40	1.39	52	Regenerated	By Pass	Passed

166		J&P	250	1461/03	YES	400-400-350	4.87	-12.41	53	Regenerated	By Pass	Passed
167		PEL	250	5685/11	YES	450-400-400	5.02	7.00	50	Regenerated	By Pass	Passed
168		T/PAK	250	2894/08	YES	350-350-300	4.72	-6.00	59	Regenerated	By Pass	Passed
169		PEL	250	2613/05	YES	450-450-350	4.83	-4.40	50	Regenerated	By Pass	Passed
170		CLIMAX	250	1329/03	YES	350-350-300	4.98	-0.72	53	Regenerated	By Pass	Passed
171		PEL	500	6089/12	NO	400-400-350	4.04	-12.06	60	New	Functional	Passed
172		T/PAK	250	1537/04	YES	400-350-350	4.47	1.19	42	Old	By Pass	Passed
173		T/PAK	250	5580/11	YES							Failed In High Voltage Test
174	22-Jun-12	CLIMAX	250	5247/11	YES	350-350-300	4.92	5.68	52	Regenerated	By Pass	Passed
175		J&P	250	6090/12	NO	450-400-400	4.33	-1.42	54	Regenerated	Functional	Passed
176		SIEMENS	750	5950/12	YES	450-450-400	4.67	17.92	53	Regenerated	By Pass	Passed
177		CLIMAX	1000	2619/05	YES	400-400-350	5.27	13.65	50	Regenerated	By Pass	Passed
178		T/PAK	500	4890/10	YES	350-350-300	5.10	7.19	56	Regenerated	By Pass	Passed
179		CLIMAX	250	6091/12	NO	450-400-400	4.82	-8.21	53	Regenerated	By Pass	Passed
180		J&P	250	6092/12	NO	450-400-350	4.84	-7.06	53	Regenerated	By Pass	Passed
181		T/PAK	250	1271/03	YES							Failed In Induced Test
182		J&P	250	3398/07	YES	350-350-300	4.20	-2.99	55	Regenerated	Functional	Passed
183	23-Jun-12	CLIMAX	250	2380/05	YES	400-400-350	4.78	-1.43	52	New	By Pass	Passed
184		PEL	250	3657/08	YES	450-450-400	4.71	0.80	55	New	By Pass	Passed
185		T/PAK	250	5875/12	YES	400-400-350	4.87	-5.66	53	New	By Pass	Passed
186		PEL	250	3526/08	YES	450-400-400	4.52	7.50	53	New	By Pass	Passed
187		SIEMENS	1000	6093/12	NO							Failed In High Voltage Test
188		T/POWER	250	5135/11	YES	350-350-300	4.93	-4.01	56	New	By Pass	Passed
189		CLIMAX	250	617/02	YES	350-350-300	4.87	-4.97	56	New	By Pass	Passed
190		T/PAK	250	5580/11	YES	450-400-350	4.80	0.76	49	Regenerated	By Pass	Passed
191	25-Jun-12	CLIMAX	500	5604/11	YES	300-300-250	5.57	10.83	59	NEW	By Pass	Passed
192		PEL	250	1409/03	YES	300-300-180	3.95	-8.69	60	NEW	By Pass	Passed
193		MML	50	6094/12	NO	450-450-400	4.07	1.90	55	NEW	Functional	Passed
194		PEL	400	6095/12	NO	350-300-300	3.80	-9.66	53	NEW	Functional	Passed
195		T.PAK	250	4726/10	YES	450-450-400	4.50	-2.18	55	NEW	By Pass	Passed
196		PEL	250	4640/10	YES							Failed In Induced

												Test
197		J&P	500	5568/11	YES							Failed In High Voltage Test
198		J&P	250	6096/12	NO	500-500-450	4.67	-14.57	62	NEW	By Pass	Passed
199		J&P	100	6097/12	NO	450-450-400	3.80	-5.98	56	NEW	Functional	Passed
200		T.PAK	250	5736/12	YES	500-500-450	4.79	-8.53	58	NEW	By Pass	Passed
201		CLIMAX	250	6098/12	NO	500-500-450	5.13	-3.03	59	NEW	By Pass	Passed
202		CLIMAX	250	283/02	YES	500-500-450	4.55	-4.05	54	NEW	By Pass	Passed
203		SIEMENS	100	6099/12	NO	450-450-400	3.63	-11.91	56	NEW	Functional	Passed
204		PEL	250	486/02	YES	400-400-200	4.30	-2.18	56	NEW	By Pass	Passed
205		PEL	250	4848/10	YES							Failed Due To Not Ready For Inspection
206	26-Jun-12	PEL	250	4848/10	YES	350-350-300	4.84	-0.47	53	New	By Pass	Passed
207		CLIMAX	250	5342/11	YES	450-400-400	4.10	4.19	51	New	By Pass	Passed
208		PEL	250	1696/04	NO	450-450-400	3.66	-5.21	50	New	By Pass	Passed
209		CLIMAX	250	4123/09	NO	450-400-350	4.66	-3.19	57	New	By Pass	Passed
210		PEL	250	5262/11	YES	350-350-300	4.12	4.48	60	New	By Pass	Passed
211		CLIMAX	250	5788/12	YES							Failed In High Voltage Test
212		CLIMAX	500	4587/10	YES	450-450-400	5.25	3.49	53	New	By Pass	Passed
213		CLIMAX	500	3138/06	NO	350-350-300	6.21	14.15	59	New	By Pass	Passed
214		T/PAK	250	6100/12	NO	450-450-400	6.36	6.98	50	New	By Pass	Passed
215		CLIMAX	250	2540/05	YES	400-400-350	4.43	5.89	60	New	By Pass	Passed
216	27-Jun-12	SIEMENS	50	6101/12	NO	350-350-300	3.64	-14.50	56	Regenerated	By Pass	Passed
217		ELMETEC	25	5060/10	YES	450-450-400	3.60	-11.73	52	Regenerated	By Pass	Passed
218		T/PAK	250	1271/03	YES	450-400-400	4.66	-7.93	58	Regenerated	Functional	Passed
219		SIEMENS	500	6016/12	YES	350-300-300	5.48	-0.47	52	Regenerated	By Pass	Passed
220		CLIMAX	150	5228/11	YES	450-400-400	4.43	19.62	59	Regenerated	By Pass	Passed
221		PEL	250	482/02	YES	350-350-300	4.30	7.15	55	Regenerated	By Pass	Passed
222		J&P	250	6102/12	NO	450-450-400	5.03	-12.52	57	Regenerated	By Pass	Passed
223		PEL	250	6103/12	NO	450-400-350	4.50	-9.69	53	Regenerated	Functional	Passed
224		SIEMENS	500	2461/05	YES	350-350-300	5.25	14.21	39	Old	By Pass	Passed
225		SIEMENS	500	6104/12	NO	300-300-250	5.19	-0.92	43	Old	By Pass	Passed

226	28-Jun-12	J&P	500	5568/11	YES	300-300-200	5.68	17.75	45	Regenerated	Functional	Passed
227		SIEMENS	25	6105/12	NO	400-400-300	3.95	1.50	51	Regenerated	Functional	Passed
228		PEL	250	5633/11	YES	250-250-200	3.92	3.44	53	Regenerated	By Pass	Passed
229		PANPOWER	50	6107/12	NO	350-350-300	3.97	14.24	50	Regenerated	By Pass	Passed
230		CLIMAX	500	5094/11	YES	300-300-200	5.48	19.94	54	Regenerated	By Pass	Passed
231		T/PAK	250	2051/04	YES	300-300-200	4.94	3.03	48	Regenerated	By Pass	Passed
232	29-Jun-12	PEL	250	5828/12	YES	450-400-400	4.65	5.48	49	Regenerated	By Pass	Passed
233		CLIMAX	250	5540/11	YES	350-350-300	4.42	4.27	47	Regenerated	By Pass	Passed
234		J&P	250	6108/12	NO	400-400-350	4.75	-1.80	47	New	By Pass	Passed
235		T/PAK	250	20/02	YES	350-300-300	5.09	14.91	49	New	By Pass	Passed
236		T/POWER	250	6109/12	NO	350-350-300	5.11	6.12	48	New	Functional	PASSED
237		SIEMENS	25	6110/12	NO	400-400-350	3.63	-2.36	53	Regenerated	By Pass	Passed
238		J&P	500	2141/04	YES	450-450-400	4.92	16.42	46	New	By Pass	Passed
239		SIEMENS	750	6111/12	NO	500-500-400	4.68	46.84	45	New	Functional	Failed Due To Over Losses
240	30-Jun-12	CLIMAX	50	6112/12	NO	350-350-300	3.61	2.83	52	New	By Pass	Passed
241		CLIMAX	50	5825/12	YES	450-400-400	4.52	11.55	53	New	By Pass	Passed
242		T/PAK	250	102/02	YES							Failed In Induced Test
243		CLIMAX	250	3032/06	YES	400-400-350	4.74	5.02	52	New	By Pass	Passed
244		CLIMAX	250	5788/12	YES	400-400-350	4.93	2.22	50	New	By Pass	Passed
245		SIEMENS	500	6113/12	NO	450-400-400	5.60	10.72	50	New	By Pass	Passed
246		T/POWER	500	6114/12	NO	350-350-300	5.37	4.14	55	New	Functional	Passed

Data Collection Sheet - July 2012

S. No.	Date of Inspection	Make	Rating (KVA)	TSW Sr. No.	Refur. Earlier by TSW (Yes/No)	IR Test (HT-E=220, HT-LT=220, LT-E=150) MΩ	% Impedance	Losses ≤ 15% for 250kVA & 20% for others	Dielectric Strength ≥ 30 kV	Condition Of Oil	Physical Discrepancy	Inspection result
										New/Old/ Regenerated		
1	02-Jul-12	J&P	500	6115/12	NO	450-450-400	4.43	7.95	58	New	Arcing Horns Missing	Passed
2		SIEMENS	50	5321/11	YES	400-400-350	3.69	-9.17	48	New	Nil	Passed
3		SIEMENS	100	4945/10	YES	350-350-300	3.95	-5.61	49	New	Nil	Passed
4		CLIMAX	750	672/02	YES	400-400-350	5.05	22.31	47	New	Nil	Failed Due To Over Losses
5		CLIMAX	50	97/02	YES	400-350-350	3.73	7.80	55	New	Nil	Passed
6		SIEMENS	100	6116/12	NO	400-400-350	4.00	1.08	63	New	Without Paint	Passed
7		SIEMENS	50	4894/10	YES	400-350-300	3.93	-2.27	53	New	Nil	Passed
8		CLIMAX	250	928/03	YES	450-450-400	4.66	12.18	56	New	Arcing Horns Missing	Passed
9		SIEMENS	100	6117/12	NO	400-350-350	4.13	-7.72	61	New	Nil	Passed
10		PEL	250	2179/04	YES	400-350-350	3.81	4.28	55	New	Without Paint	Passed
11		PEL	500	926/03	YES							Failed Due To Oil Leakage
12	03-Jul-12	PEL	500	926/03	YES	500-500-500	4.53	5.25	52	New	Body Not Painted	Passed Subject To The Condition Of Painting
13		CLIMAX	750	671/02	YES	550-500-500	5.09	36.81	50	New	Body Not Painted	Failed Due To Over Losses

14		CLIMAX	500	6121/12	NO	700-800-600	5.23	43.17	54	New	TSW Sr. No. Plate Missing	Failed Due To Over Losses
15		PEL	250	6120/12	NO	800-800-800	4.45	11.46	52	New	Body Not Painted, TSW Sr. No. Plate Missing	Passed
16		SIEMENS	100	5089/11	YES	600-600-600	3.98	-7.71	61	New	Nil	Passed
17		SIEMENS	100	6118/12	NO	700-700-800	4.00	-1.30	59	New	Body Not Painted, TSW Sr. No. Plate Missing	Passed
18		SIEMENS	100	6119/12	NO	600-600-600	4.14	2.94	56	New	Body Not Painted, TSW Sr. No. Plate Missing	Passed
19		CLIMAX	500	3664/08	YES	500-500-500	4.82	17.55	53	New	Nil	Passed
20	04-Jul-12	PEL	250	2516/05	YES	600-600-550	4.52%	14.82%	59	New	Nil	Passed
21		PEL	250	6122/12	NO	800-700-700	4.96%	22.88%	50	New	Nil	Failed Due To Over Losses
22	05-Jul-12	CLIMAX	50	6106/12	NO	300-250-280	4.34%	17.70%	43	Regenerated	Oil Level Indicator Defective	Passed Subject To The Replacement Of Oil Level Indicator
23		CLIMAX	250	6123/12	NO	350-320-280	4.83%	6.49%	49	Regenerated	Nil	Passed
24		SIEMENS	500	6124/12	NO	……..	……..	……..	……..	……..	……..	Failed Due To Not Withstanding Induced Test
25		CLIMAX	50	6127/12	NO	420-400-400	4.25%	1.56%	55	Regenerated	Nil	Passed
26		J&P	250	6126/12	NO	350-300-250	4.35%	4.57%	56	Regenerated	Body Not Painted	Passed Subject To

												The Condition Of Painting Of Body
27		PEL	250	6125/12	NO	450-400-350	4.61%	-1.89%	49	Regenerated	Nil	Passed
28		T-POWER	250	1312/03	YES	350-350-250	5.06%	12.29%	53	Regenerated	Nil	Passed
29	06-Jul-12	CLIMAX	250	584/02	YES	400-400-250	4.82%	6.07%	43	Regenerated	Nil	Passed
30		T-PAK	250	6128/12	NO	450-400-400	4.73%	-0.09%	49	Regenerated	Nil	Passed
31		T-PAK	250	102/02	YES	300-350-250	5.35%	8.21%	57	Regenerated	Nil	Passed
32		J&P	500	6129/12	NO	250-300-0	4.73%	17.41%	55	Regenerated	Conservator Tank Damaged	Failed Due To Low Insulation Resistance & Damaged Conservator Tank
33		PEL	250	6130/12	NO	350-300-200	4.70%	0.19%	55	Regenerated	Nil	Passed
34	07-Jul-12	CLIMAX	250	5993/12	NO	350-300-200	4.78%	7.09%	42	Regenerated	Paint In Bad Condition	Passed Subject To The Condition Of Painting
35		PEL	250	5187/11	YES	350-300-200	4.54%	5.05%	46	Regenerated	Nil	Passed
36		PEL	250	494/02	YES	350-300-200	3.74%	6.42%	35	Regenerated	Nil	Passed
37		SIEMENS	500	6124/12	NO	200-150-100	5.53%	24.67%	45	Regenerated	Nil	Failed Due To High Losses & Low Insulation Resistance
38		PEL	500	6131/12	NO	200-150-100	5.08%	26.12%	43	Regenerated	Body Not Painted	Failed Due To High Losses
39	09-Jul-12	CLIMAX	50	4310/09	NO	400-400-300	3.85	18	44	Regenerated	Nil	Passed
40		CLIMAX	250	5780/12	YES	400-400-350	5	12.64	42	Regenerated	Nil	Passed
41		CLIMAX	250	6133/12	NO	450-450-400	4.9	6.65	49	Regenerated	Nil	Passed
42		CLIMAX	250	4513/10	YES	450-400-400	4.78	9.77	47	Regenerated	Nil	Passed

43		CLIMAX	250	154/02	YES	450- 450- 350	4.41	12.33	43	Regenerated	Nil	Passed
44		SIEMENS	150	6134/12	NO	400- 400- 400	4.95	10.04	46	Regenerated	Nil	Passed
45		T/POWER	500	6135/12	NO	400- 350- 350	5	-0.44	48	Regenerated	Nil	Passed
46		PEL	500	6131/12	NO	450- 450-350	5.03	8.84	52	Regenerated	Not Painted	Passed
47	10-Jul-12	CLIMAX	250	3959/09	YES	500- 450- 450	4.01	8.07	52	Regenerated	LT Palm Cu.	Passed
48		J&P	250	2112/04	YES	450- 450- 450	4.44	-3.48	51	Regenerated	LT Palm Cu.	Passed
49		CLIMAX	250	6136/12	NO	400- 400- 350	5.0	4.88	57	Regenerated	LT Palm Cu.	Passed
50		SIEMENS	250	4851/10	YES	450- 450- 400	4.55	-1.51	53	Regenerated	LT Palm Cu.	Passed
51		PEL	250	2886/06	YES					Regenerated	-----	Failed In Induced Test
52		J&P	500	6129/12	YES	400-400-350	4.68	17.46	48	Regenerated	Nil	Passed
53		T/PAK	500	1675/04	YES	450-450-400	8.29	24.51	55	Regenerated	------'	(I)Failed Due To Over Loses (Ii) Abnormal % Impedance (Iii)Did Not Pick Rated Current When Load Losses Measured
54		SIEMENS	500	6124/12	YES	350-350-300	5.39	17.9	48	Regenerated	Nil	Passed
55	11-Jul-12	PEL	250	6122/12	YES	350-300-300	4.83	13.02	44	Regenerated	Arcing Horns Missing	Passed
56		CLIMAX	50	6137/12	NO	400-350-350	4.03	12.02	49	Regenerated	Nil	Passed
57		CLIMAX	50	916/03	NO	350-350-60	3.6	0.55	46	Regenerated	Nil	Failed In I.R Test
58		PEL	250	6138/12	NO	350-350-300	3.77	11.81	48	Regenerated	Arcing Horns Missing	Passed
59		CLIMAX	250	5116/11	YES	400-400-350	3.93	3.99	45	Regenerated	L.T Plams Missing	Passed
60		CLIMAX	500	2597/05	YES	450-400-400	6.06	18.08	45	Regenerated		Failed Due

												To Rated Current Did Not Pick When Load Losses Measured
61		T/PAK	250	981/03	YES	350-350-300	4.97	8.39	52	Regenerated	Arcing Horns Missing	Passed
62		SIEMENS	500	2515/05	YES	400-400-350	5.1	14.53	51	Regenerated		Passed
63		CLIMAX	250	3728/08	YES	350-350-300	4.86	8.72	47	Regenerated	Nil	Passed
64		PEL	250	2189/04	YES	400-400-400	4.3	10.38	44	Regenerated	Paint In Bad Condition	Passed Subject To The Condition Of Painting
65		CLIMAX	250	5286/11	YES	450-400-400	5.0	3.44	43	Regenerated	Nil	Passed
66		SIEMENS	25	6140/12	NO				51	Regenerated	Nil	Failed In High Voltage Test
67	12-Jul-12	CLIMAX	500	6139/12	NO	350-350-300	6.19	19.93	41	Regenerated	Nil	Failed Due To Rated Current Did Not Pick When Load Losses Measured
68		MML	250	1374/03	YES	400-350-350	4.82	-2.97	40	Regenerated	Nil	Passed
69		T/PAK	500	660/02	YES	450-450-400	5.38	19.28	39	Regenerated	Oil Leackage From Oil Level Gauge	Passed
70		CLIMAX	250	3663/08	YES	300-300-250	5.17	9.06	38	Regenerated	Palms Missing	Passed
71		CLIMAX	750	5970/12	YES	450-400-350	5.18	38.75	43	Regenerated	Nil	Failed Due To Over

												Losses
72	13-Jul-12	CLIMAX	250	4030/09	YES	350-350-300	4.92	4.98	39	Regenerated	Arcing Horns Missing	Passed
73		J&P	500	6141/12	YES	400-350-300	4.83	9.19	47	Regenerated	Nil	Passed
74		SIEMENS	500	6142/12	NO	450-450-400	5.3	12.38	42	Regenerated	Top Plate Paint In Bad Condition	Passed Subject To The Condition Of Painting
75		PEL	250	4640/10	YES	300-300-250	4.72	5.87	43	Regenerated	Top Plate Paint In Bad Condition	Passed Subject To The Condition Of Painting
76		CLIMAX	50	916/03	YES	400-400-350	4.94	-12.04	46	Regenerated	Arcing Horns Missing	Passed
77		PEL	250	5248/11	YES	450-450-400	4.62	9.84	41	Regenerated	Nil	Failed Due To Oil Leakage From Inspection Plate
78	14-Jul-12	J&P	250	4278/09	YES	350-350-300	4.98	-2.37	46	Regenerated	Palms Missing	Passed
79		SIEMENS	100	6143/12	NO	400-350-350	3.81	-18.48	51	Regenerated	Nil	Passed
80		SIEMENS	25	6144/12	NO	450-450-400	3.9	4.64	53	Regenerated	Nil	Passed
81		CLIMAX	250	1481/03	YES	400-350-300	4.51	14.25	43	Regenerated	Top Plate Paint In Bad Condition	Passed Subject To The Condition Of Painting
82		PEL	250	2886/06	YES	350-300-300	4.11	2.27	42	Regenerated	Arcing Horns Missing	Passed
83		SIEMENS	500	6145/12	NO							Failed In

												High Voltage Test
84	16-Jul-12	PEL	250	5248/11	Yes	350-300-300	4.63	10.94	52	Regenerated	Ok	Passed
85		PEL	200	2727/05	Yes	300-300-250	3.82	-5.32	43	Regenerated	Cu. Palm	Passed
86		CLIMAX	150	6146/12	No	400-400-350	4.4	11.34	43	Regenerated	Cu. Palm	Passed
87		CLIMAX	250	6147/12	No	450-400-400	5.21	3.34	53	Regenerated	Ok	Passed
88		SIEMENS	500	6145/12	No	350-350-300	4.83	10.94	47	Regenerated	Ok	Passed
89		CLIMAX	750	5524/11	Yes	450-450-400	5.13	22.19	49	Regenerated	-----	Failed Due To Over Losses
90		PEL	200	2506/05	Yes	350-300-300	4.05	-8.53	51	Regenerated	Ok	Passed
91		PEL	250	6149/12	No	400-400-350	4.63	4.08	49	Regenerated	Ok	Passed
92		CLIMAX	250	6150/12	No	350-350-300	4.74	3.51	54	Regenerated	Ok	Passed
93		J&P	250	6151/12	No	300-300-300	5.07	-5.58	46	Regenerated	Ok	Passed
94		SIEMENS	25	6140/12	No	300-300-250	3.91	-3.32	48	Regenerated	Ok	Passed
95		CLIMAX	500	6139/12	No	300-300-250	6.29	14.7	50	Regenerated	Ok	Passed
96		CLIMAX	500	2597/05	Yes	350-300-300	6.05	12.3	44	Regenerated	Ok	Passed
97	17-Jul-12	SIEMENS	250	6152/12	NO	400-400-350	4.83	-7.53	51	Regenerated	Nil	Passed
98		PEL	200	5808/12	YES	350-300-300	4.06	-4.83	52	Regenerated	Palms Missing	Passed
99		J&P	250	6148/12	NO	300-300-250	4.96	-0.2	50	Regenerated	Nil	Passed
100		T/POWER	250	6153/12	NO	400-400-300	5.39	0.68	47	Regenerated	Nil	Passed
101		PEL	200	2402/05	YES	450-450-400	4.3	-5.21	48	Regenerated	Nil	Passed
102		T/PAK	250	2735/05	YES	400-350-350	4.92	2.56	41	Regenerated	Arcing Horns Missing	Passed
103		J&P	250	6154/12	NO							Failed As Did Not Pick Rated Voltage When No Load Loss Test So Leakage Current Increase.
104		SIEMENS	400	6155/12	NO							Failed In High Voltage

												Test
105		PEL	250	6156/12	NO	300-300-250	4.69	-0.48	50	Regenerated	Nil	Passed
106	18-Jul-12	PEL	250	6157/12	NO	300-350-300	4.66	8.08	47	Regenerated	Arcing Horns Missing	Passed
107		CLIMAX	250	3122/06	YES	300-300-250	5.18	2.79	45	Regenerated	Nil	Passed
108		J&P	250	1003/03	YES	350-350-300	5.01	-3	51	Regenerated	Nil	Passed
109		PEL	500	6158/12	NO	400-450-400	4.35	8.81	46	Regenerated	Arcing Horns Missing	Passed
110		PEL	150	6159/12	NO	350-300-300	4.15	5.11	49	Regenerated	Nil	Passed
111		T/PAK	500	936/03	YES	450-400-400	5.5	16.51	43	Regenerated	Palms Missing	Passed
112	19-Jul-12	CLIMAX	150	5973/12	YES	400-400-400	4.44	24.44	52	Regenerated	Palms Missing	Failed Due To Over Losses
113		J&P	250	6160/12	NO	350-300-300	5.08	-1.17	51	Regenerated	Nil	Passed
114		CLIMAX	500	6161/12	NO	300-300-250	4.28	10.96	49	Regenerated	Nil	Passed
115		PEL	250	1353/03	YES	300-300-250	4.48	7.22	50	Regenerated	Palms Missing	Passed
116		CLIMAX	500	6121/12	YES	450-450-400	4.96	15.96	47	Regenerated	Nil	Passed
117		PEL	250	4655/10	YES	300-300-200	4.62	14.91	48	Regenerated	Nil	Passed
118		J&P	250	590/02	YES	300-300-250	4	-4.21	47	Regenerated	Nil	Passed
119	20-Jul-12	T/POWER	200	6162/12	NO	450-400-300	3.95	1.93	42	Regenerated	Nil	Passed
120		J&P	250	6154/12	YES	300-300-250	4.15	5.78	51	Regenerated	Palms Missing	Passed
121		CLIMAX	250	6163/12	NO	350-300-250	5	1.27	42	Regenerated	Nil	Passed
122		SIEMENS	500	4466/10	YES	450-450-300	5.25	8.95	48	Regenerated	Nil	Passed
123		T/PAK	250	5506/11	YES	400-350-300	4.9	5.34	52	Regenerated	Nil	Passed
124		CLIMAX	250	6165/12	NO	300-300-250	4.88	11.57	39	Regenerated	Nil	Passed
125		PEL	250	2389/05	YES						Palms Missing	Failed In Induced Test
126		T/PAK	500	6164/12	NO	350-350-300	3.62	11.28	39	Regenerated	Nil	Passed
127	21-Jul-12	T/POWER	200	6166/12	NO	400-400-350	3.83	-2	47	Regenerated	Nil	Passed
128		J&P	250	6167/12	NO	300-300-300	4.2	5.9	50	Regenerated	Oil Leak From Conservator Tank	Failed Due To Oil Leakage
129		CLIMAX	500	6168/12	NO	400-400-350	3.74	5.79	48	Regenerated	Palms	Passed

											Missing	
130		CLIMAX	250	6169/12	NO	350-350-300	4.43	14.11	42	Regenerated	Nil	Passed
131		PEL	200	5771/12	YES							Failed In Induced Test
132		CLIMAX	250	6065/12	YES	450-400-350	4.87	-0.61	51	Regenerated	Arcing Horns Missing	Passed
133		PEL	200	6170/12	NO	300-300-250	3.82	-0.92	49	Regenerated	Nil	Passed
134		CLIMAX	500	6171/12	NO	350-300-300	5.64	14.17	43	Regenerated	Palms Missing	Passed
135		PEL	200	1392/03	YES	400-400-300	3.73	1.56	42	Regenerated	Nil	Passed
136		SIEMENS	400	6155/12	YES	350-350-300	4.01	6.86	49	Regenerated	Nil	Passed
137		T/POWER	25	6173/12	NO	400-350-40	3.8	-6.6	53	Regenerated	Arcing Horns Missing	Failed In I.R Test
138		J&P	250	602/02	YES	450-450-400	4.95	2.36	47	Regenerated	Palms Missing	Passed
139		SIEMENS	50	5129/11	YES	400-400-350	4.28	-1.74	52	Regenerated	Nil	Passed
140		CLIMAX	250	2743/05	YES	300-300-250	4.25	8.09	41	Regenerated	Nil	Passed
141	23-Jul-12	T/PAK	500	1675/04	YES	450-400-350	4.94	8.07	42	Regenerated	Arcing Horns Missing	Passed
142		SIEMENS	500	6174/12	NO	400-400-350	4.2	14.29	44	Regenerated	Nil	Passed
143		CLIMAX	250	5304/11	YES	300-300-300	5.04	12.07	43	Regenerated	Nil	Passed
144		PEL	150	2826/05	YES	350-350-300	4.94	-0.8	40	Regenerated	Palms Missing	Passed
145		T/POWER	200	6172/12	NO				50	Regenerated	Nil	Failed In High Voltage Test
146		PEL	50	5884/12	YES	300-300-250	4.1	-1.89	43	Old	Nil	Passed
147		PEL	200	6180/12	NO	350-300-300	4.1	4.19	43	Old	Arcing Horns Missing	Passed
148	24-Jul-12	CLIMAX	500	6177/12	NO	400-350-350	5.49	18.53	53	Old	Palms Missing	Passed
149		J&P	500	6178/12	NO	450-450-400	4.94	13.9	57	Old	Nil	Passed
150		CLIMAX	50	6179/12	NO	350-300-300	3.96	8.78	50	Old	Nil	Passed
151		T/POWER	200	6172/12	YES	400-350-300	3.9	-2.22	52	Old	Arcing	Passed

											Horns Missing	
152		J&P	250	6167/12	YES	300-300-300	4.21	6.98	50	Old	Nil	Passed
153		CLIMAX	500	232/03	YES	350-300-250	5.93	16.4	50	Old	Nil	Passed
154		CLIMAX	250	6175/12	NO					Old	Palms Missing	Failed In High Voltage Test
155		CLIMAX	50	6176/12	NO	400-350-350	4.8	11.95	50	Old	Nil	Passed
156	25-Jul-12	PEL	200	6181/12	NO	350-350-300	3.91	-0.68	49	Regenerated	Nil	Passed
157		PEL	250	1757/04	YES						Arcing Horns Missing	Failed In High Voltage Test
158		CLIMAX	250	6175/12	YES	400-350-350	4.94	11.66	56	Regenerated	Palms Missing	Passed
159		CLIMAX	50	5024/10	YES	450-450-400	4.46	14.98	42	Regenerated	Nil	Passed
160		SIEMENS	25	6182/12	NO	350-350-300	4.33	12.98	40	Regenerated	Nil	Passed
161		PEL	50	6184/12	NO	300-300-250	4.06	0.19	43	Regenerated	Arcing Horns Missing	Passed
162		PEL	500	6183/12	NO	400-400-350	4.68	19.01	46	Regenerated	Palms Missing	Passed
163		ELMETEC	25	5060/10	YES	350-350-300	3.9	-3.8	52	Regenerated	Nil	Passed
164	26-Jul-12	PEL	250	1757/04	YES	800-800-600	4.226	9.67	52	Regenerated	Nil	Passed
165		PEL	250	302/02	YES				43	Regenerated	Nil	Failed In Induced Test
166		CLIMAX	250	5258/12	YES	500-500-500	5.15	14.78	47	Regenerated	Paint In Bad Condition	Passed
167		T/POWER	200	6185/12	NO	600-600-400	3.88	-3.53	51	Regenerated	Nil	Passed
168		CLIMAX	250	5990/12	YES	450-450-300	4.46	8.28	50	Regenerated	Nil	Passed
169		CLIMAX	500	6186/12	NO	400-450-300	5.48	25.93	42	Regenerated	Leakage From Top Plate	Failed Due To Over Losses & Leakage From Top Plate
170		SIEMENS	500	6113/12	YES	250-250-100	4.99	7.35	46	Regenerated	Nil	Failed Due

												To Low I.R
171		CLIMAX	250	2832/05	YES						Body Not Painted	Failed In 2kv Test
172		CLIMAX	250	5164/11	YES	450-450-400	4.15	0.37	44	Regenerated	Nil	Passed
173		CLIMAX	250	5887/12	YES	350-350-300	4.68	8.77	47	Regenerated	Palms Missing	Passed
174		J&P	250	770/03	YES	400-400-350	2.83	-7.55	51	Regenerated	Nil	Failed Due To Low Impendence
175		PEL	400	6187/12	NO	300-300-250	3.76	-5.71	49	Regenerated	Oil Leakage From LT Bushing	Failed Due To Oil Leakage From L.T Bushing Side
176		CLIMAX	100	6188/12	NO	350-300-300	3.67	-4.23	51	Regenerated	Nil	Passed
177	28-Jul-12	CLIMAX	1000	1183/03	YES	300-300-250	5.35	19.05	41	Regenerated	Nil	Failed Due To High Leakage Current (15A) At 21kv Test
178		SIEMENS	50	6189/12	NO	400-400-300	3.86	-5.68	43	Regenerated	Palms Missing	Passed
179		SIEMENS	500	6113/12	YES	450-450-400	4.94	3.76	43	Regenerated	Nil	Passed
180		J&P	250	5160/11	YES	350-350-300	4.3	-2.64	45	Regenerated	Body Without Paint	Passed Subject To The Condition Of Painting
181		J&P	250	6190/12	NO	400-400-350	4.9	-0.82	50	Regenerated	Body Without Paint	Passed Subject To The Condition Of Painting
182		CLIMAX	250	2854/06	YES	450-400-400	4.89	14.31	48	Regenerated	Body	Passed

											Without Paint	Subject To The Condition Of Painting
183		PEL	250	2389/05	YES	350-300-300	4.45	10.28	52	Regenerated	Nil	Passed
184		PEL	250	302/06	YES	300-300-250	4.61	12.27	47	Regenerated	Palms Missing	Passed
185		PEL	250	6047/12	YES	350-300-300	4.96	11.63	42	Regenerated	Nil	Passed
186		CLIMAX	250	3570/08	YES					Regenerated	Nil	Failed In High Voltage Test
187		CLIMAX	250	2285/05	YES	400-400-350	4.61	3.81	50	Regenerated	Body Not Painted	Passed
188		CLIMAX	500	2860/06	YES	350-350-300	5.37	16.3	53	Regenerated	Body Not Painted	Passed
189		SIEMENS	500	6132/12	YES	450-450-400	5.53	15.06	52	Regenerated	Nil	Passed
190		CLIMAX	500	6186/12	YES	400-350-350	5.17	11.63	44	Regenerated	Nil	Passed
191	30-Jul-12	CLIMAX	250	2329/05	YES	300-300-300	4.87	14.78	42	Regenerated	Body Not Painted	Passed
192		T/PAK	250	6191/12	NO	300-300-250	4.64	-1	49	Regenerated	Body Not Painted	Passed
193		CLIMAX	250	2293/04	YES	400-400-350	4.73	10.41	56	Regenerated	Nil	Passed
194		PEL	50	4277/09	YES	350-350-300	4.62	4.53	53	Regenerated	Nil	Passed
195		SIEMENS	50	6192/12	NO	400-400-300	4.13	17.94	50	Regenerated	Palms Missing	Passed
196		PEL	250	6193/12	NO					Regenerated	Nil	Failed In Induced Test
197		PEL	400	6187/12	YES	450-450-350	3.77	-6.19	55	Regenerated	Nil	Passed
198		CLIMAX	1000	1183/03	YES	400-350-350	5.36	19.11	41	Regenerated	Nil	Passed
199		CLIMAX	250	6194/12	YES	400-400-300	4.51	10.65	43	Regenerated	Body Not Painted	Passed
200	31-Jul-12	CLIMAX	250	4396/10	YES	350-350-350	4.74	-0.57	47	Regenerated	Arcing Horns Missing	Passed
201		CLIMAX	250	4618/10	YES	400-400-350	4.52	12.52	50	Regenerated	Nil	Passed
202		CLIMAX	250	2271/04	YES					Regenerated	Nil	Failed In High

												Voltage Test
203		CLIMAX	250	2832/05	YES	300-300-250	4.97	10.59	42	Regenerated	Nil	Passed
204		T/PAK	250	3456/08	YES	450-400-400	4.66	0.84	44	Regenerated	Body Not Painted	Passed
205		PEL	250	2748/05	YES	450-450-400	4.87	7.17	45	Regenerated	Palms Missing	Passed
206		CLIMAX	250	3570/08	NO	350-350-300	4.69	9.56	41	Regenerated	Body Not Painted	Passed
207		CLIMAX	250	4811/10	YES					Regenerated	Nil	Failed In High Voltage Test
208		CLIMAX	1000	3620/08	YES	350-350-300	5.05	19.62	52	Regenerated	Body Not Painted	Passed
209		CLIMAX	750	671/02	NO	300-300-250	4.86	19.31	47	Regenerated	Palms Missing	Passed
210		CLIMAX	750	5970/12	NO	350-300-300	5.12	18.75	43	Regenerated	Nil	Passed
211		CLIMAX	150	5973/12	YES	450-450-400	4.29	19.01	50	Regenerated	Nil	Passed

Data Collection Sheet – August 2012

S. NO	Date of Inspection	Make	Rating (KVA)	TSW Sr. No.	Refur. Earlier by TSW (Yes/No)	IR Test (HT-E=220, HT-LT=220, LT-E=150) MΩ	% Impedance WAPDA 3.6 - 4.4 & KESC 4 - 5.5	Losses ≤ 15% for 250kVA & 20% for others	Dielectric Strength ≥ 30 kV	Condition Of Oil New/Old	Physical Discrepancy	Inspection result
1	02-Aug-12	PEL	200	5771/12	YES	800-800-700	3.72	1.27	47	Regenerated	Nil	Passed
2		CLIMAX	250	2271/04	YES	800-800-600	4.10	5.86	52	Regenerated	Nil	Passed
3		CLIMAX	250	2869/06	YES	600-600-500	4.93	13.23	39	Regenerated	Body Not Painted	Passed
4		CLIMAX	250	4811/10	YES	700-750-600	5.35	9.90	44	Regenerated	Body Not Painted	Passed
5		J&P	250	6196/12	NO	700-700-600	4.74	-2.09	49	Regenerated	Body Not Painted	Passed
6		J&P	250	6197/12	NO	600-600-600	4.32	2.88	52	Regenerated	Body Not Painted	Passed
7		MML	250	6198/12	NO	600-700-600	3.96	4.45	56	Regenerated	Body Not Painted	Passed
8		CLIMAX	250	6199/12	NO	800-700-650	5.24	8.86	53	Regenerated	Nil	Passed
9		J&P	500	6200/12	NO	600-600-650	4.56	4.85	41	Regenerated	Nil	Passed
10		PEL	500	6201/12	NO							Failed In High Voltage Test
11		CLIMAX	250	3205/07	YES	650-600-600	4.94	14.25	52	Regenerated	Paint Is Not In Good Condition	Passed
12		J&P	250	6195/12	YES	600-700-1000	4.28	2.38	52	Regenerated	Nil	Passed
13	04-Aug-12	J&P	250	5371/11	YES	700-600-600	4.18	9.98	45	Regenerated	Nil	Passed
14		PEL	250	457/02	YES	500-500-550	4.36	14.55	47	Regenerated	Nil	Passed
15		J&P	250	5940/12	YES	600-650-600	4.92	-4.03	40	Regenerated	Paint In Bad	Passed

											Condition	
16		PEL	500	6201/12	YES	550-550-500	4.76	8.62	40	Regenerated	Nil	Passed
17		PEL	250	3735/08	YES	600-600-500	4.97	5.71	35	Regenerated	Paint In Bad Condition	Passed
18		PEL	250	6193/12	YES	700-800-750	5.10	13.87	40	Regenerated	Body Not Painted	Passed
19		PEL	250	1849/04	YES	500-500-500	4.94	12.69	45	Regenerated	Nil	Passed
20		CLIMAX	50	6202/12	NO	700-800-7000	3.80	5.69	40	Regenerated	Nil	Passed
21		SIEMENS	50	6203/12	NO							Failed In High Voltage Test
22		PEL	250	6204/12	NO	600-700-700	4.68	6.28	38	Regenerated	Nil	Passed
23		PEL	250	4583/10	YES	600-600-550	5.19	-3.23	40	Regenerated	Body Not Painted	Passed
24		CLIMAX	250	2154/04	YES	700-700-650	4.79	6.79	39	Regenerated	Nil	Passed
25		CLIMAX	500	5578/11	YES						Body Not Painted	Failed In Induced Test
26	06-Aug-12	PEL	250	1855/04	YES	350-350-300	4.66	9.16	35	Regenerated	Palms Missing	Passed
27		PEL	250	2607/05	YES	400-400-350	4.57	12.89	49	Regenerated	Nil	Passed
28		CLIMAX	250	6205/12	NO	300-300-250	4.16	-1.85	38	Regenerated	Body Not Painted	Failed Due To Taking High Current At No Load
29		CLIMAX	250	6206/12	NO	450-450-400	5.74	11.96	42	Regenerated	Arching Horns Missing	Passed
30		PEL	250	5975/12	YES	400-350-350	4.59	8.12	41	Regenerated	Nil	Passed
31		PEL	250	3146/06	YES							Fail In High Voltage Test
32		CLIMAX	250	5307/11	YES							Fail In 2kv Test
33		SIEMENS	50	5110/11	YES							Fail In High Voltage Test
34		SIEMENS	50	5170/11	YES	300-300-250	3.82	-8.58	41	Regenerated	Body not	Passed

											painted	
35		SIEMENS	500	6207/12	NO	400-350-350	4.55	7.95	39	Regenerated	Nil	Passed
36		T/PAK	500	2976/06	YES	350-350-300	3.91	18.49	40	Regenerated	Nil	Passed
37	07-Aug-12	PEL	250	2149/04	YES	400-450-400	4.88	12.21	42	Regenerated	Palms missing	Passed
38		PEL	250	6208/12	NO	350-300-300	4.52	-2.13	50	Regenerated	Nil	Passed
39		J&P	250	6209/12	NO	400-400-350	4.91	-3.23	46	Regenerated	Palms missing	Passed
40		PEL	250	6210/12	NO	450-400-400	5.21	13.37	39	Regenerated	Arching horn missing	Passed
41		PEL	250	6212/12	NO							Failed In High Voltage Test
42		PEL	500	6211/12	NO	300-300-250	4.58	18.23	40	Regenerated	Nil	Passed
43		T/POWER	500	6213/12	NO	400-350-300	4.61	17.46	51	Regenerated	Body not painted	PASSED Subject To The Condition Of Painting
44		SIEMENS	50	5110/11	YES	450-450-400	3.94	-11.38	53	Regenerated	Nil	Passed
45	08-Aug-12	T/POWER	250	6214/12	NO	350-350-300	5.51	-1.01	45	Regenerated	Not Painted	PASSED Subject To The Condition Of Painting
46		J&P	250	5381/11	YES	400-400-350	4.46	-4.53	47	Regenerated	Not Painted	PASSED Subject To The Condition Of Painting
47		PEL	250	5236/11	YES	450-450-400	4.35	-0.89	45	Regenerated	Arcing Horns Missing	Passed
48		CLIMAX	250	6215/12	NO	400-400-300	4.38	5.84	51	Regenerated	Nil	Passed
49		CLIMAX	250	5307/11	YES				38	Regenerated		Failed In High Voltage Test
50		SIEMENS	250	6216/12	NO	400-400-350	3.85	-7.58	43	Regenerated	Arcing Horns Missing	Passed
51		SIEMENS	50	6212/12	YES	400-300-300	4.47	2.45	43	Regenerated	Not Painted	PASSED Subject To The Condition Of Painting

52		SIEMENS	500	6217/12	NO	450-400-400	4.77	2.45	41	Regenerated	Nil	Passed
53		T/PAK	500	6218/12	NO				40	Regenerated		Failed In 2kv Test
54		CLIMAX	250	5307/11	YES	300-350-300	4.74	11.97	39	Regenerated	Nil	Passed
55		T/PAK	250	5422/11	YES	350-350-300	4.95	9.25	46	Regenerated	Nil	Passed
56		PEL	250	5234/11	YES	400-400-300	4.12	-4.23	51	Regenerated	Body Not Painted	Passed
57		PEL	250	4425/10	YES	450-450-400	4.39	1.27	45	Regenerated	Nil	Passed
58		CLIMAX	250	1167/03	YES	350-350-300	4.95	11.19	50	Regenerated	Nil	Passed
59	09-Aug-12	CLIMAX	250	5932/12	YES						Oil Leakage From LT Bushing	Failed In 2KV Test
60		CLIMAX	50	2956/06	YES	400-350-350	3.75	11.24	51	Regenerated	Body Not Painted	Passed
61		J&P	500	6219/12	NO	400-400-350	4.24	12.75	41	Regenerated	Nil	Passed
62		SIEMENS	500	6220/12	NO						Arcing Horns Missing	Failed In High Voltage Test
63		MML	250	4997/10	YES	300-300-250	4.75	-6.66	42	Regenerated	Nil	Passed
64		SIEMENS	500	6220/12	NO	350-400-300	4.64	4.64	51	Regenerated	Nil	Passed
65		SIEMENS	50	6221/12	NO	400-400-300	4.01	-7.58	41	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Painting
66		J&P	250	2727/05	YES	450-450-400	4.06	-1.60	48	Regenerated	Nil	Passed
67	11-Aug-12	T/PAK	250	102/02	YES	450-400-400	5.34	8.94	39	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Painting
68		PEL	500	5132/11	YES	450-300-300	3.81	14.07	52	Regenerated	Nil	Passed
69		CLIMAX	250	5932/12	YES	400-350-350	4.70	11.62	47	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Painting
70		CLIMAX	500	5578/11	YES	450-350-350	5.42	15.92	48	Regenerated	Nil	Passed
71		PEL	250	6222/12	NO	350-350-300	3.99	-8.18	42	Regenerated	Arcing Horns	Passed

											Missing	
72		CLIMAX	250	6223/12	NO	300-350-300	4.41	1.17	49	Regenerated	Arcing Horns Missing	Passed
73		J&P	250	2680/05	YES	300-300-250	4.48	-3.67	42	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Painting
74		PEL	50	2862/06	YES	400-400-350	4.22	-2.06	39	Regenerated	Nil	Passed
75		T/PAK	250	1224/04	YES	350-400-300	4.74	-0.67	48	Regenerated	Arcing Horns Missing	Passed
76		T/PAK	500	6218/12	YES	350-350-350	4.55	19.91	46	Regenerated	Nil	Passed
77		PEL	500	6224/12	NO							Failed In High Voltage Test
78		T/PAK	500	6225/12	NO							Failed In Induced Test
79	13-Aug-12	SIEMENS	50	5986/12	YES	350-350-300	3.80	-7.78	47	Old	Nil	Passed
80		CLIMAX	250	5210/11	YES							Fail In 2kv Test
81		CLIMAX	250	5905/12	YES	450-450-400	4.99	12.63	39	Old	Arcing Horns Missing	Passed
82		CLIMAX	250	2653/05	YES	400-400-350	5.42	10.14	47	Old	Nil	Passed
83		CLIMAX	150	6226/12	NO	450-450-400	4.19	18.59	36	Old	Palms missing	Passed
84		SIEMENS	50	5125/11	YES	350-300-300	4.08	-6.40	41	Old	Nil	Passed
85		SIEMENS	50	6203/12	YES	450-400-350	3.82	-8.35	39	Old	Body Not Painted	PASSED Subject To The Condition Of Painting
86		PEL	500	6224/12	YES	300-300-250	4.65	18.95	43	Old	Body Not Painted	PASSED Subject To The Condition Of Painting
87		T/PAK	500	6227/12	NO	350-350-300	3.77	17.63	42	Old	Body Not Painted	PASSED Subject To The Condition Of Painting
88		T/PAK	500	6225/12	YES	450-400-400	3.62	14.86	41	Old	Arcing	Passed

											Horns Missing	
89		SIEMENS	50	1990/04	YES	400-400-350	4.52	4.12	38	Old	Body Not Painted	PASSED Subject To The Condition Of Painting
90		T/PAK	500	2603/05	YES	300-300-60	3.76	15.54	44	Old	Nil	Fail In Low I.R
91		CLIMAX	250	2259/04	YES	350-350-300	4.61	4.62	41	Old	Body Not Painted	PASSED Subject To The Condition Of Painting
92		T/PAK	250	2050/04	YES							Fail In Induced Test
93		CLIMAX	250	5210/11	YES	350-350-300	4.49	2.86	42	Regenerated	Nil	Passed
94		CLIMAX	250	6205/12	YES	300-300-250	4.28	13.96	46	Regenerated	Nil	Passed
95		T/PAK	500	1847/04	YES	350-300-300	4.18	19.15	50	Regenerated	Nil	Passed
96		T/PAK	500	6228/12	NO	300-300-250	3.70	16.22	48	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Painting
97		PEL	250	6229/12	NO	400-350-300	3.91	-3.55	49	Regenerated	Palms missing	Passed
98	15-Aug-12	CLIMAX	500	4614/10	YES						Nil	Fail In High Voltage Test
99		CLIMAX	250	3040/04	YES	350-300-250	4.07	10.42	51	Regenerated	Oil Leakage From Top Cover Plate	Failed Due To Oil Leakage
100		PEL	50	4205/09	YES	300-300-250	3.78	0.97	50	Regenerated	Nil	Passed
101		T/POWER	250	5135/11	YES						Nil	Fail In 2kv Test
102		CLIMAX	250	3040/04	YES	300-300-250	4.07	10.42	51	Regenerated	Palm Missing	Passed
103	16-Aug-12	T/PAK	250	2050/04	YES	350-300-250	4.88	4.58	48	Regenerated		Passed
104		T/POWER	250	5135/11	YES	400-350-300	5.19	6.34	52	Regenerated		Passed
105		T/PAK	500	2603/05	YES	300-300-250	3.63	15.16	48	Regenerated	Arching Horns	Passed

											Missing	
106		PEL	500	6230/12	NO	300-350-300	3.87	18.98	51	Regenerated		Passed
107		CLIMAX	50	3486/06	YES	350-300-250	4.31	6.45	47	Regenerated	Body Not Painted	Failed Due To The Worst Condition Of Body
108		J&P	250	1024/03	YES	400-350-350	4.92	0.21	50	Regenerated	Body Not Painted	Failed Due To The Worst Condition Of Body
109		PEL	500	1006/03	YES	300-350-300	4.52	16.88	39	Regenerated		Passed
110	17-Aug-12	CLIMAX	250	2569/05	YES	350-300-300	4.94	13.57	46	Regenerated	Nil	Passed
111		CLIMAX	250	2283/04	YES	400-350-250	4.30	7.37	47	Regenerated	Palms missing	Passed
112		PEL	250	1828/04	YES	300-300-250	5.01	13.62	45	Regenerated	Nil	Passed
113		PEL	500	6231/12	NO	300-300-250	3.85	19.67	48	Regenerated	Arching Horns Missing	Passed
114		PEL	250	5037/10	YES	350-300-300	3.78	0.10	48	Regenerated	Oil Leakage From Top Cover Plate	Failed Due To Oil Leakage
115		SIEMENS	1000	6093/12	YES	300-250-250	5.72	31.39	47	Regenerated	Nil	Failed Due To Over Losses
116		CLIMAX	50	3486/06	YES	350-300-250	4.31	6.45	47	Regenerated	Nil	Passed
117		J&P	250	1024/03	YES	400-350-350	4.92	0.21	50	Regenerated	Nil	Passed
118	18-Aug-12	PEL	250	6234/12	NO	130-130-100	3.84	-1.67	45	Regenerated	Body not Painted, Temp gauge, LT Clams & Breather Missing	Failed Due To Low I.R
119		T/PAK	500	6233/12	NO	300-400-200	3.43	15.97	43	Regenerated	LT Clams & Breather Missing,	Failed Due To Low Impendence

											Body not Painted	
120		PEL	250	5680/11	YES	500-500-350	3.84	-1.97	41	Regenerated	LT Clams & Breather Missing	Passed Subject To Condition Of Removal Of Physical Discrepancies
121		PEL	250	5037/10	YES	500-500-300	3.78	0.10	47	Regenerated	Body not Painted, Breather Missing	Passed Subject To Condition Of Removal Of Physical Discrepancies
122		SIEMENS	50	6232/12	NO	250-500-300	3.88	-4.38	49	Regenerated	Body not Painted, LT Clams Missing	Passed Subject To Condition Of Removal Of Physical Discrepancies
123	19-Aug-12	SIEMENS	750	6235/12	NO	300-250-150	5.16	18.85	62	New	Body Not Painted	Passed
124	23-Aug-12	CLIMAX	250	6236/12	NO	400-400-200	4.97	10.51	47	New	Body not painted, LT clamps, breather and No. plate missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancies
125		PEL	500	2425/05	YES	50-50-15	4.59	23	41	Regenerated	Body not painted, LT clamps & breather missing, conservator tank damaged	FAILED Due To High Losses, Low IR & Damaged Conservator Tank
126		CLIMAX	250	3565/08	YES	300-300-200	4.51	-0.33	42	Regenerated	Body not painted, LT clamps,	PASSED Subject To The Condition Of Removal

											breather and No. plate missing	Of Physical Discrepancies
127		PEL	250	6234/12	YES	350-400-200	3.9	-3.42	43	New	Top plate not painted, LT clamps, breather, temp gauge & No. plate missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancies
128		PEL	250	467/02	YES	220-220-150	4.8	14.81	46	New	Body not painted, LT clamps, breather and temp gauge missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancies
129		SIEMENS	50	4949/10	YES	400-750-400	4.03	17.07	45	Regenerated	Body not painted	PASSED Subject To The Condition Of Removal Of Physical Discrepancies
130	24-Aug-12	CLIMAX	250	3560/08	YES	800-600-500	4.93	9.5	43	New	Body not painted	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
131		PEL	250	6238/12	NO	500-450-400	4.47	-0.31	50	New	Body not painted, number plate missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancies
132		CLIMAX	500	290/02	YES	450-450-300	5.3	19.37	48	New	Transfor	PASSED

											mer not painted	Subject To The Condition Of Removal Of Physical Discrepancy
133		CLIMAX	250	5827/12	YES	500-500-400	4.74	7.08	42	New	Nil	Failed Due To Abnormal Sound During 21kv Test
134		CLIMAX	250	2362/05	YES	500-500-300	4.61	5.58	47	New	Body not painted	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
135		T/PAK	500	6239/12	NO	300-300-150	3.6	15.71	47	New	Body not painted	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
136	25-Aug-12		250	6240/12								PASSED Subject To The Condition Of Removal Of Physical Discrepancies
137			250	6241/12								PASSED Subject To The Condition Of Removal Of Physical Discrepancies
138			250	6242/12								FAILED Due To Leakage
139			250	1236/03								FAILED Due To Low IR
140			50	6243/12								Not Attended Due To Mob Attack At DFS

141			500	2739/05								Not Attended Due To Mob Attack At DFS
142	27-Aug-12	SIEMENS	50	6244/12	NO					Regenerated	Nil	Failed In High Voltage Test
143		SIEMENS	500	2739/05	YES	300-350-250	4.13	9.77	42	Regenerated	Body Not Painted & Breather Missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
144		SIEMENS	50	5162/11	YES					Regenerated	Nil	Failed In High Voltage Test
145		CLIMAX	250	2327/05	YES	200-200-100	4.49	8.29	39	Regenerated	Nil	Failed In I.R Test
146		SIEMENS	50	6243/12	YES	350-400-200	3.84	-8.98	40	Regenerated	Body Not Painted , Breather & Temp Gauge Missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
147		T/PAK	500	6233/12	YES	350-300-250	3.69	14.62	43	Regenerated	Body Not Painted & Breather Missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
148		CLIMAX	1000	2702/05	YES	350-300-250	5.25	19.71	41	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
149		PEL	500	6245/12	NO	300-400-200	5.02	19.49	44	Regenerated	Body Not Painted , Breather & Temp Gauge Missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancy

150		J&P	250	1471/03	YES	500-500-300	5.04	-0.63	42	Regenerated	Nil	Passed
151		J&P	250	6246/12	NO	350-350-250	4.13	7.78	47	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Paint
152		CLIMAX	250	2327/05	YES	400-300-300	4.51	5.39	39	Regenerated	Body Not Painted	PASSED Subject To The Condition Of Paint
153	28-Aug-12	PEL	250	5827/12	YES	600-600-500	4.78	5.35	40	Regenerated	Nil	Passed
154		J&P	250	6247/12	NO	350-350-200	4.26	1.75	17	Regenerated	Nil	Failed Due To Low Die-Electric
155		Siemens	50	6248/12	NO	600-600-500	3.82	-5.27	49	Regenerated	Nil	Passed
156		Siemens	50	4458/10	YES	600-600-500	3.67	-4.94	46	Regenerated	Nil	Passed
157		Siemens	50	6244/12	YES	600-600-400	4.04	17.87	39	Regenerated	Nil	Passed
158		J&P	250	1236/03	YES	400-300-200	4.31	0.79	21.7	Regenerated	Body Not Painted	Failed Due To Low Die-Electric
159		CLIMAX	500	4614/10	YES	500-500-400	4.95	17.23	49	New	Nil	Passed
160		SIEMENS	50	6249/12	NO	600-500-400	3.62	-9.49	48	New	Body Not painted	PASSED Subject To The Condition Of Paint
161		PEL	250	6250/12	NO							Failed In High Voltage Test
162		T/POWER	500	6251/12	NO	300-300-200	5.31	4.67	36	New	Nil	Passed
163	29-Aug-12	PEL	250	6242/12	YES	300-325-200	3.92	-6.93	39	New	Body Not painted	PASSED Subject To The Condition Of Paint
164		T/PAK	250	3780/08	YES							Failed In 2KV Test
165		SIEMENS	50	5162/11	YES	600-500-500	3.75	0.99	50	New	Nil	Passed
166		PEL	250	3903/09	YES	700-600-600	4.62	9.74	41	New	Nil	Passed
167		T/PAK	500	6252/12	NO	500-400-400	4.95	11.13	43	New	Body Not painted	PASSED Subject To The Condition Of Paint
168		J&P	250	1236/03	YES	500-500-300	4.31	0.39	41	New	Nil	Passed

169		CLIMAX	250	2342/05	YES	600-600-400	4.71	11.83	39	New	Nil	Passed
170	30-Aug-12	PEL	250	6250/12	NO	400-400-300	4.62	2.44	39	New	Body not Painted	PASSED Subject To The Condition Of Paint
171		T/PAK	250	3780/08	YES	500-400-300	5.01	3.32	38	New	Paint In bad Conditio n	PASSED Subject To The Condition Of Paint
172		J&P	250	2123/04	YES	400-400-300	4.78	-0.73	54	New	NIL	Passed
173		T/PAK	150	6253/12	NO	500-500-350	4.77	17.86	46	New	NIL	Passed
174		J&P	250	6256/12	YES	450-450-400	3.78	-1.58	39	New	Breather Missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
175		J&P	250	5769/12	YES	400-400-300	4.93	11.48	35	New	NIL	Passed
176		PEL	250	1273/03	YES	600-400-300	4.55	14.75	53	New	NIL	Passed
177		PEL	50	6257/12	NO	500-500-400	4.04	0.53	37	New	Body not painted	PASSED Subject To The Condition Of Paint
178		CLIMAX	150	4804/10	YES	400-300-300	4.73	18.58	35	New	NIL	Passed
179		CLIMAX	150	6255/12	NO	300-400-250	4.5	18	50	New	NIL	Passed
180		J&P	250	3602/08	YES							Failed In High Voltage Test
181		CLIMAX	250	1843/04	YES							Failed In 2KV Test
182		PEL	250	6254/12	NO							Failed In High Voltage Test
183	31-Aug-12	CLIMAX	500	2730/05	YES						NIL	Failed In High Voltage Test
184		J&P	250	3602/08	YES	400-400-350	4.91	0.2	40	New	NIL	Passed
185		J&P	250	6247/12	YES	300-350-250	4.69	9.09	42	New	NIL	Passed
186		PEL	250	6254/12	NO	450-400-300	3.8	-1.79	42	New	Body Not Painted	PASSED Subject To The Condition Of Removal Of Physical

												Discrepancy
187		CLIMAX	250	1843/04	YES	500-500-300	4.9	11.13	40	New	NIL	Passed
188		PEL	500	6237/12	NO	400-450-350	4.5	17.15	43	New	NIL	Passed
189		PEL	250	6258/12	NO	450-400-400	4.29	2.63	41	Regenerated	Breather Missing	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
190		SIEMENS	50	4892/10	YES	600-600-400	4	10.73	53	Regenerated	NIL	Passed
191		J&P	250	770/03	YES	350-300-300	3.62	0.37	42	Regenerated	NIL	Passed
192		SIEMENS	500	461/02	YES	400-350-350	4.82	18.93	38	New	Body Not Painted	PASSED Subject To The Condition Of Removal Of Physical Discrepancy
193		PEL	250	6259/12	NO							Failed In 2KV Test
194		PEL	250	6260/12	NO	500-450-400	3.77	-1.46	40	New	NIL	Passed

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