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No. DG19121066



B0021253110



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国际互认
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TESTING
CNAS L0107



(2018)国认监认字(418)号

检 验 报 告

TEST REPORT

Specimen: Oil - immersed power transformer

Model: SZ11-10000/35

Consignor: TSTY Electric Co., Ltd



国家高低压电器质量监督检验中心

National High-low Voltage Electrical Apparatus Quality Supervision and Inspection Center

甘肃电器科学研究院

Gansu Electric Apparatus Research Institute

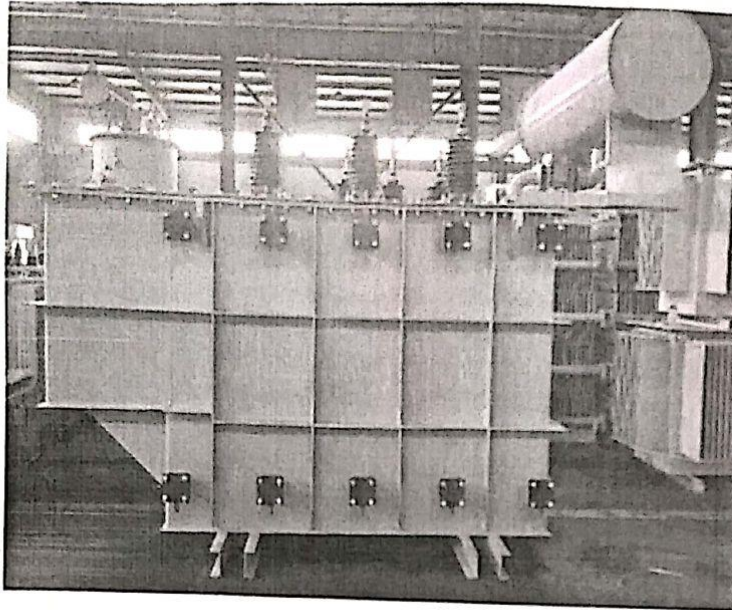
NEIC		Test Report	Application No.: WG19121035
Catalogue			
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	End of the report		
Remarks	The testing items involved in this report are completed in No. 6-6 Changkai Road, Qinzhou District, Tianshui City, Gansu Province.		

NEIC	Test Report	Application No.: WG19121035
Test conclusion		
<p>Specimen: SZ11-10000/35 Oil - immersed power transformer Consignor: TSTY Electric Co., Ltd Consignor address: Factory Address: Industry cluster district, Jiaxian, Pingdingshan City, Henan Province, China Manufacturer: TSTY Electric Co., Ltd Manufacturer address: Factory Address: Industry cluster district, Jiaxian, Pingdingshan City, Henan Province, China</p> <p>Test items: Insulating fluid test (routine) Winding insulation resistance measurement between winding to ground and winding (routine) Voltage ratio measurement and junction group label verification (routine) Winding resistance measurement (routine) Insulation routine test (routine) No-load loss and no-load current measurement (routine) No load loss and no load loss current measurement under 90% and 110% of rated voltage (type) Short circuit impedance and load loss measurement (routine) Liquid immersed transformer pressure seal test (routine) Temperature rise test (type) Short-time overload capacity test (type) Transformer pressure deformation test (special) Fuel tank cracking test (special) Three-phase transformer zero-sequence impedance measurement (special) No-load current harmonic measurement (commissioned) Lightning impulse test (type) Sound level measurement (type)</p> <p>Test Basis: GB/T1094.1-2013 <i>Power transformers—Part 1: General</i> GB/T1094.2-2013 <i>Power transformers—Part 2: Temperature rise for liquid-immersed transformers</i> GB/T1094.3-2017 <i>Power transformers—Part 3: Insulation levels, dielectric tests and external clearances in air</i> GB/T1094.10-2003 <i>Power transformers—Part 10: Determination of sound levels</i> GB/T6451-2015 <i>Specification and technical requirements for oil-immersed power transformers</i> IEC 60076-1:2011 <i>Power transformers - Part 1: General</i> IEC 60076-2:2011 <i>Power transformers - Part 2: Temperature rise for liquid-immersed transformers</i> IEC 60076-3-2013 <i>Power transformers - Part 3: Insulation levels, dielectric tests and external clearances in air</i> IEC 60076-10:2001 <i>Power transformers - Part 10: Determination of sound levels</i></p> <p>Test Conclusion: The test results of all items comply with regulations of test standards and technical documents; the relevant performances of the specimen are qualified.</p>		
Drafted by: Na Yan Signature: Na Yan Date: Jan. 2, 2020	Reviewed by: Wang Yan Signature: Wang Yan Date: Jan. 2, 2020	Audited by: Liu Yan Signature: Liu Yan Date: Jan. 2, 2020
Approved by: Hu Xinming Signature: Hu Xinming Date: Jan. 2, 2020		

NEIC	Test Report	Application No.: WG19121035
General description		
Specimen: SZ11-10000/35 Oil - immersed power transformer Manufacturer: TSTY Electric Co., Ltd Manufacturer address: Factory Address: Industry cluster district, Jiaxian, Pingdingshan City, Henan Province, China Ex-factory number: 201911008 Ex-factory date: November 2019 Receipt date of the specimen: December 6, 2019		
Main technical data of the specimen	Rated voltage: kV	35/10.5
	Rated Capacity: kVA	10000
	Rated frequency: Hz	50
	Rated current: A	165/549.9
	Connection symbol:	YNd11
	Cooling method:	ONAN
	the maximum unbalance rate of three-phase windings:	$\leq 1\%$ (line) $\leq 2\%$ (phase)
	No-load current: %	$\leq 0.35^{+30\%}$
	No-load current: kW	$\leq 6.96^{+0\%}$
	Short circuit impedance voltage (75°C) : %	$8.0^{\pm 10\%}$
	Load loss (75°C) : kW	$\leq 40.80^{+0\%}$
	Total loss (75°C) : kW	$\leq 47.76^{+0\%}$
	Insulating oil breakdown voltage kV	≥ 35
	Winding temperature rise limit: K	≤ 60
	Lightning impulse withstand voltage: kV	Full wave:200 Chop wave:220
Sound power level: dB(A)	≤ 70	
Note	/	
Representative from entrusting company: He Yaomin		
Test date: December 5, 2019~ December 13, 2019		

Photos of the Specimen

Photos of the specimen appearance (including appearance and nameplate):



Oil-immersed power transformer

Product Model	SZ11-10000/35	Standard code	GB/T1094.1.2-2013 GB/T1094.3-2017 GB/T1094.5-2008
Rated capacity	10000 KVA	Product Code	TSDQ.711.022
Rated voltage	35/10.5 KV	Rated Frequency	50Hz
Rated Frequency	50Hz	Phase number	3 mutually
Connection group label	YNd11	Cooling mode	ONAN
Short circuit impedance	8.0 %	Insulation level	LI 200 AC 85
Body weight	4300 Kg	Conditions of Use	Outdoor style
Oil weight	11330 Kg		
Gross weight	18950 Kg		
Serial Number	201911008		
Date of manufacture	2019 year 11 month		

Tapping position	high pressure		low pressure	
	Voltage V	Electric current A	Voltage V	Electric current A
1	36750			
2	35875			
3	35000	165	10500	549.9
4	34125			
5	33250			

TSTY Electric Co., Ltd

Clause	Test items and requirements	Measurements or observations						Test result										
		#01																
GB/T1094.1-2013 11.1.2.1(l) IEC 60076-1:2011 clause 11	<p>Insulating fluid test (routine)</p> <p>Ambient air temperature: (+5 °C ~ +40 °C)</p> <p>Specimen temperature: (°C)</p> <p>Humidity: (%)</p> <p>Air pressure: (pa)</p> <p>Dielectric dissipation factor: $\tan\delta (90^\circ) \leq 0.01$</p> <p>Transformer oil sample number:</p> <p>Apply voltage for the first time on the specimen 5 min after its assembled, check and make sure no visible bubble. Then gradually apply with the speed of 2.0 kV/s\pm0.2 kV/s until it is broken down, the circuit opens automatically (make constant arc) or opens manually (can smell or discharge) and make maximum voltage.</p> <p>After 2 min pause, reapply for 6 times. There should be no bubbles between poles. If stir, it requires keep stirring during the test.</p> <p>The average value of the 6 breakdown voltages was calculated, and the breakdown voltage value was ≥ 35 k</p>	13	11	59	88830	0.0074	25#	Qualified										
Meet the requirements		<table border="1"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>48.1 kV</td> <td>49.7 kV</td> <td>50.3 kV</td> <td>50.5 kV</td> <td>49.4 kV</td> <td>49.8 kV</td> </tr> </table> <p style="text-align: center;">49.6 kV</p>	1	2	3	4	5		6	48.1 kV	49.7 kV	50.3 kV	50.5 kV	49.4 kV	49.8 kV			
1	2	3	4	5	6													
48.1 kV	49.7 kV	50.3 kV	50.5 kV	49.4 kV	49.8 kV													

Clause	Test items and requirements	Measurements or observations			Test result																																											
		#01																																														
GB/T1094.1-2013 11.1.2.1(e) IEC 60076-1:2011 clause 11	Windings to the ground and between windings DC insulation resistance measurement (routine)	13			Provide data																																											
	Ambient air temperature : (+5°C ~ +40°C)	59																																														
	Humidity: (%)	88830																																														
	Gas pressure: (pa)	88830																																														
	Application site	Applied voltage (V)	The measured resistance value (GΩ)																																													
	High pressure (A, B, C) for low pressure (a, b, c) and ground (F)	2500	47.8																																													
	Low pressure (a, b, c) versus high pressure (A, B, C) and ground (F)	2500	45.2																																													
	High pressure (A, B, C) and low pressure (a, b, c) to ground (F)	/	/																																													
GB/T1094.1-2013 11.3 IEC 60076-1:2011 clause 11	Measurement of voltage ratio and connection symbol test (routine)	13			Qualified																																											
	Ambient air temperature: (+5 °C ~ +40°C)	59																																														
	Humidity: (%)	88830																																														
	Air pressure: (pa)	88830																																														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">HV winding</th> <th>LV winding</th> <th rowspan="2">Calculati on ratio</th> <th colspan="3">The actual measured ratio difference (%)</th> </tr> <tr> <th>Tapping points</th> <th>Voltage (kV)</th> <th>Voltage (kV)</th> <th>AB/ab</th> <th>BC/bc</th> <th>CA/ca</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>36.750</td> <td rowspan="5" style="text-align: center;">10.5</td> <td>3.5000</td> <td>0.02</td> <td>0.03</td> <td>0.01</td> </tr> <tr> <td>2</td> <td>35.875</td> <td>3.4166</td> <td>0.01</td> <td>0.02</td> <td>0.03</td> </tr> <tr> <td>3</td> <td>35.000</td> <td>3.3333</td> <td>0.01</td> <td>0.01</td> <td>0.00</td> </tr> <tr> <td>4</td> <td>34.125</td> <td>3.2500</td> <td>0.02</td> <td>0.02</td> <td>0.01</td> </tr> <tr> <td>5</td> <td>33.250</td> <td>3.1666</td> <td>0.04</td> <td>0.03</td> <td>0.02</td> </tr> </tbody> </table>	HV winding		LV winding	Calculati on ratio	The actual measured ratio difference (%)			Tapping points	Voltage (kV)	Voltage (kV)	AB/ab	BC/bc	CA/ca	1	36.750	10.5	3.5000	0.02	0.03	0.01	2	35.875	3.4166	0.01	0.02	0.03	3	35.000	3.3333	0.01	0.01	0.00	4	34.125	3.2500	0.02	0.02	0.01	5	33.250	3.1666	0.04	0.03	0.02			
HV winding		LV winding	Calculati on ratio	The actual measured ratio difference (%)																																												
Tapping points	Voltage (kV)	Voltage (kV)		AB/ab	BC/bc	CA/ca																																										
1	36.750	10.5	3.5000	0.02	0.03	0.01																																										
2	35.875		3.4166	0.01	0.02	0.03																																										
3	35.000		3.3333	0.01	0.01	0.00																																										
4	34.125		3.2500	0.02	0.02	0.01																																										
5	33.250		3.1666	0.04	0.03	0.02																																										
	Connection group label:	YNd11																																														
	Test wiring schematic:	See Figure 3 for three-phase transformer voltage ratio measurement wiring diagram																																														

Clause	Test items and requirements	Measurements or observations				Test result
		#01				
GB/T1094.1-2013 11.2 IEC 60076-1:2011 clause11	Measurement of winding resistance (routine)					Qualified
	Ambient air temperature: (+5°C ~ +40°C)	13				
	Humidity: (%)	59				
	Air pressure: (pa)	88830				
	Top layer liquid temperature: (°C)	13.1				
	Bottom liquid temperature: (°C)	13.1				
	Winding temperature: (°C)	13.1				
	Winding	Tap position	The actual measured value(Ω)			
		A~B a~b	B~C b~c	C~A c~a	≤1%	
High voltage	1	0.6356	0.6360	0.6364	0.13	
	2	0.6293	0.6296	0.6300	0.11	
	3	0.6227	0.6231	0.6235	0.13	
	4	0.6162	0.6166	0.6171	0.15	
	5	0.6097	0.6100	0.6105	0.13	
Low voltage	/	0.472×10^{-3}	0.474×10^{-3}	0.475×10^{-3}	0.63	
Low voltage (phase resistance)	/	a~o	b~o	c~o	/	
		/	0.240×10^{-3}	/	/	
Maximum unbalance rate of three phases at high voltage winding and low voltage winding: ≤2%		≤1% Meet the requirements				

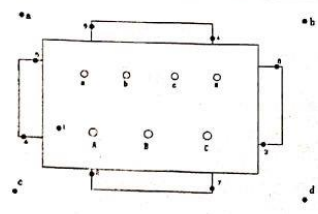
Clause	Test items and requirements	Measurements or observations		Test result										
		#01												
GB/T1094.3-2017 10 IEC60076-3:2000 clause10	Insulation routine test (routine) 1 External withstand voltage test (routine)			Qualified										
	Ambient air temperature: (+5°C ~ +40°C)	12												
	Humidity: (%)	61												
	Air pressure: (pa)	88870												
	Power frequency: 50Hz	50												
	<table border="1"> <thead> <tr> <th>Applied position</th> <th>Applied voltage kV</th> <th>Applied time s</th> <th>test results</th> </tr> </thead> <tbody> <tr> <td>High pressure (A, B, C) for low pressure (a, b, c) and ground (F)</td> <td>85</td> <td>60</td> <td rowspan="2">Test voltage did not drop suddenly during the test</td> </tr> <tr> <td>Low pressure (a, b, c) versus high pressure (A, B, C) and ground (F)</td> <td>35</td> <td>60</td> </tr> </tbody> </table>	Applied position	Applied voltage kV	Applied time s	test results	High pressure (A, B, C) for low pressure (a, b, c) and ground (F)	85	60	Test voltage did not drop suddenly during the test	Low pressure (a, b, c) versus high pressure (A, B, C) and ground (F)	35	60		
Applied position	Applied voltage kV	Applied time s	test results											
High pressure (A, B, C) for low pressure (a, b, c) and ground (F)	85	60	Test voltage did not drop suddenly during the test											
Low pressure (a, b, c) versus high pressure (A, B, C) and ground (F)	35	60												
GB/T1094.3-2017 11 IEC60076-3:2000 clause11	Test wiring schematic: 2 Induction withstand voltage test (routine)	See Figure 5 for the external pressure test wiring diagram		Qualified										
	Ambient air temperature: (+5 °C ~ +40°C)	12												
	Humidity: (%)	61												
	Air pressure: (pa)	88870												
	Applied position:	Winding tap position3												
	Applied frequency: 200Hz	200												
	Applied time: 30s	30												
	Voltage applied at low voltage: kV	21												
	High voltage side induced voltage: measured value kV	70												
	test results:	There was no sudden drop in the test voltage during the test.												
Test wiring schematic:	See Figure 6 for the induction voltage test wiring diagram													

Clause	Test items and requirements	Measurements or observations		Test result
		#01		
GB/T1094.1-2013 11.5 IEC 60076-1:2011 clause 1	No load loss and no load current measurement (routine) Ambient air temperature: (+5 °C ~ +40°C) Humidity: (%) Air pressure: (pa) Test position: Test frequency: 50Hz Applied voltage: (V) Root mean square voltage (V) No load current (A): average value No load current (%): $\leq 0.5^{+30\%}$ No load dissipation correction value (W): $\leq 384^{+0\%}$ Test wiring schematic:	12 61 88870 Low voltage winding 50 10500 Average value on the voltmeter 10502	Mean square value on the voltmeter 10505 1.54 0.28 6941 See Figure 2 for three-phase transformer air test wiring diagram	Qualified

Clause	Test items and requirements	Measurements or observations		Test result
		#01		
GB/T1094.1-2013 11.1.3(e) IEC 60076-1:2011 clause 1	No load loss and no load current measurement under 90% and 110% of rated voltage (type) Under 90% rated voltage: Ambient air temperature: (+5 °C ~ +40°C) Humidity: (%) Air pressure: (pa) Test position: Test frequency: 50Hz Applied voltage: (V) Root mean square voltage (V) No load current (A): average value No load current (%) No load dissipation correction value (W): Test wiring schematic: Under 110% rated voltage: Ambient air temperature: (+5 °C ~ +40°C) Humidity: (%) Air pressure: (pa) Test position: Test frequency: 50Hz Applied voltage: (V) Root mean square voltage (V) No load current (A): average value No load current (%) No load dissipation correction value (W): Test wiring schematic:	12 61 88870 Low voltage winding 50 9450 Average value on the voltmeter 9450.2 1.04 0.17 6835 See Figure 2 for three-phase transformer air test wiring diagram 12 61 88870 Low voltage winding 50 11550 Average value on the voltmeter 11552 2.00 0.40 7050 See Figure 2 for three-phase transformer air test wiring diagram	Mean square value on the voltmeter 9450.5 Mean square value on the voltmeter 11555	Qualified

Clause	Test items and requirements	Measurements or observations			Test result	
		#01				
GB/T1094.1-2013 11.4 IEC 60076-1:2011 clause 1	Short-circuit impedance and load loss measurement (routine) Ambient air temperature: (+5 °C ~ +40°C) Humidity: (%) Air pressure: (pa) Test position: Test frequency: 50Hz	Tapping position: 1、 3、 5			Qualified	
	Tapping position	1	3	5		
	Measured voltage (V)	2895.8	2747.1	2603.0		
	Applied current (A)	157.10	164.94	173.61		
	Load loss (W)	38710	38847	38930		
	Short-circuit impedance voltage (%)	7.88	7.85	7.83		
	Load loss correction value 75°C (kW): $\leq 40.8^{+0\%}$	40.56	40.61	40.68		
	Total loss (kW) : $\leq 47.76^{+0\%}$	47.50	47.55	47.62		
	Short circuit impedance voltage 75°C (%): $8.0^{+10\%}$	Uk(%)	7.98	7.95		7.93
		Zk(Ω)	10.78	9.74		8.77
	Test wiring schematic:	See Figure 1 for three-phase transformer load wiring diagram				

Clause	Test items and requirements	Measurements or observations	Test result
		#01	
GB/T1094.1-2013 11.8 IEC 60076-1:2011 clause 1	Pressure sealed test for liquid-immersed transformer (routine) Ambient air temperature: (+5 °C ~ +40 °C) Humidity: (%) Air pressure: (pa) experiment method: Apply pressure: (kPa) Duration: (h) Residual pressure: (kPa) test results:	13 62 88850 Inflatable pressure method 60 24 58.7 No leakage and damage	Qualified

Clause	Test items and requirements	Measurements or observations	Test result
		#01	
GB/T1094.2-2013 IEC 60076-2:2011	Temperature rise test(type)		Qualified
	Ambient air temperature: (+5 °C ~ +40°C)	12	
	Humidity: (%)	59	
	Air pressure: (pa)	88870	
	Test tapping switch position: experiment method:	Tapping position 3 Analog short circuit method	
	Test time: 9h	9	
	Rated current A:	165	
	1. When apply total load loss, the top layer oil temperature rise rate should less than 1K per hour and keep for 3h until the temperature rise goes steady. Top layer oil temperature rise: ≤53K		
	Applied total loss (kW)	47.55	
	Radiator outlet temperature (°C)	34.4	
34.5			
34.5			
34.4			
34.4			
Top oil temperature rise (K)	49.7		
Average oil temperature rise (K)	35.7		
			

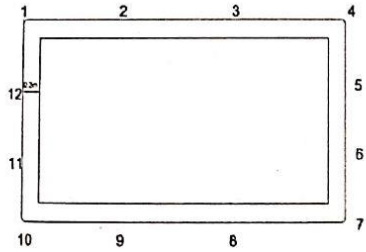
Clause	Test items and requirements	Measurements or observations		Test result
		#01		
GB/T1094.2-2013 IEC 60076-2:2011	2. High and low voltage winding resistance measurement			Qualified
	Measurement time	Thermal resistance R (Ω)	Thermal resistance R (Ω)	
	1min30s	0.723	0.546×10^{-3}	
	2min	0.714	0.537×10^{-3}	
	2min30s	0.705	0.528×10^{-3}	
	3min	0.697	0.520×10^{-3}	
	3min30s	0.691	0.514×10^{-3}	
	4min	0.685	0.508×10^{-3}	
	4min30s	0.678	0.501×10^{-3}	
	5min	0.671	0.494×10^{-3}	
	5min30s	0.666	0.489×10^{-3}	
	6min	0.662	0.485×10^{-3}	
	6min30s	0.651	0.480×10^{-3}	
	7min	0.653	0.476×10^{-3}	
	7min30s	0.649	0.472×10^{-3}	
	8min	0.646	0.469×10^{-3}	
	8min30s	0.644	0.467×10^{-3}	
	9min	0.641	0.464×10^{-3}	
	9min30s	0.639	0.462×10^{-3}	
	10min	0.637	0.460×10^{-3}	
High voltage winding resistance (Ω)	Hot resistance 0.7602	Cold resistance 0.6231		
Low voltage winding resistance (Ω)	0.583×10^{-3}	0.474×10^{-3}		
High voltage winding average temperature rise≤60K	53.7			
Low voltage winding average temperature rise≤60K	56.2			
Winding thermal resistance curve see:	Figure 1,2			

Clause	Test items and requirements	Measurements or observations	Test result
		#01	
GB/T6451-2015 4.3.7	<p>Short-time overload capacity test (type)</p> <p>Ambient air temperature: (+5°C ~ +40°C)</p> <p>Humidity: (%)</p> <p>Air pressure: (pa)</p> <p>After the temperature rise test is completed from the high operating oil level, 1.5 times the rated load of 8.27A is applied, and the following requirements should be met after 2 hours of continuous operation:</p> <ol style="list-style-type: none"> 1.The pressure protection device is not operating; 2.No leakage phenomenon; 3.The deformation of the tank corrugated and the chip radiator is within the specified range; 4.The temperature rise of the fuel tank casing and casing is not more than 85K. <p>Test wiring schematic:</p>	<p>12</p> <p>62</p> <p>88870</p> <p>No action</p> <p>No leakage</p> <p>Meet the requirements</p> <p>58K</p> <p>Meet the requirements</p> <p>See Figure 1 for three-phase transformer load wiring diagram</p>	Qualified

Clause	Test items and requirements	Measurements or observations			Test result
		#01			
GB/T6451-2015 4.3.8	Transformer pressure deformation test (special)				Qualified
	Ambient air temperature: (+5°C ~ +40°C)	12			
	Humidity: (%)	62			
	Air pressure: (pa)	88870			
	Test method:	Static pressure method			
	Applied pressure: (kpa)	60			
	Duration time: (min)	5			
	Measurement items	High pressure side			
		Left	Middle	Right	
	the initial value of measured distance (mm)	283	285	281	
	Measured value after applying pressure (mm)	278	281	277	
	Measured value after removal of pressure (mm)	281	284	280	
	Elastic deformation (mm)	5	4	4	
	Permanent deformation (mm)	2	1	1	
	Measurement items	Low voltage side			
		Left	Middle	Right	
	the initial value of measured distance (mm)	283	280	282	
	Measured value after applying pressure (mm)	278	276	278	
	Measured value after removal of pressure (mm)	281	279	280	
	Elastic deformation (mm)	5	4	4	
	Permanent deformation (mm)	2	1	2	
Measurement items	Left side	Right side			
	Middle	Middle			
the initial value of measured distance (mm)	283	281			
Measured value after applying pressure (mm)	279	277			
Measured value after removal of pressure (mm)	282	280			
Elastic deformation (mm)	4	4			
Permanent deformation (mm)	1	1			
Test result	No damage and deformation meets the requirements				

Clause	Test items and requirements	Measurements or observations	Test result
		#01	
GB/T6451-2015 4.3.9	Fuel tank cracking test (special) Ambient air temperature: (+5 °C ~ +40 °C) Humidity: (%) Air pressure: (pa) experiment method: Applied pressure: (kpa) Duration time: (min) Test result:	12 62 88870 Inflatable pressure method 103 10 No crack on the oil tank	Qualified

Clause	Test items and requirements	Measurements or observations	Test result
		#01	
GB/T1094.10-2003 IEC60076-10:2001	Measurement of sound level (special)		Qualified
	Ambient air temperature: (+5°C ~ +40°C)	13	
	Humidity: (%)	61	
	Gas pressure: (pa)	88850	
		57	
	Load current sound power level estimate: $L_{WA,IN} \approx 39 + 18 \lg S_r / S_p$	Because of the LWA, the IN value is 70dB(A) lower than the guaranteed sound power level requirement of 13dB(A). According to the standard requirements, only the no-load sound power level measurement is required.	
	Apply voltage:V	10500	
	Power frequency:50Hz	50	
	The distance between measuring points: m	0.65	
	the height of the measure point: m	1.1	
	Distance from the reference emission surface: m	0.3	
	Measuring point: one	12	
	Measurement environment		
	Laboratory surface area m ²	2424	
Average absorption sound coefficient α	0.15		
Sound absorption amount A	364		
Measuring surface area m ²	18.10		
Environmental correction factor dB(A)	0.79		
Cooling device status	/		

Clause	Test items and requirements	Measurements or observations				Test result	
		#01					
GB/T1094.10-2003 IEC 60076-1:2011	Measuring point	Background noise sound pressure level		Specimen SPL	Specimen SPL after corrected background noise	Qualified	
		Before test	Before test				
		1	33.1	33.4	52.4		/
		2	33.0	33.3	52.6		/
		3	33.1	33.3	52.5		/
		4	33.2	33.4	52.5		/
		5	33.2	33.5	52.4		/
		6	33.1	33.4	52.3		/
		7	33.0	33.3	52.4		/
		8	33.2	33.5	52.3		/
		9	33.1	33.5	52.3		/
		10	33.1	33.4	52.4		/
		11	33.0	33.3	52.4		/
		12	33.1	33.5	52.3		/
Arithmetic mean (dB(A))		33.1	33.4	52.4	/		
 <p>A weighted sound pressure level: dB(A) 52</p> <p>A weighted sound power level LWA, IN: ≤ 70dB (A) 65</p>							

Clause	Test items and requirements	Measurements or observations	Test result
		#01	
GB/T1094.1-2013 11.6 IEC 60076-1:2011 clause 11	Three-phase transformer zero sequence impedance measurement (special)		Provide data
	Ambient air temperature: (+5 ~ +40°C)	12	
	Humidity: (%)	61	
	Gas pressure: (pa)	88870	
	Connection group label: Dyn11	YNd11	
	Rated frequency: 50Hz	50	
	Power supply terminal:	A,B,C -O	
	Open circuit terminal:	a, b, c	
	Applied current: A	165.0	
	Measuring voltage: V	1.529	
Impedance: Ω	0.0278		

Clause	Test items and requirements	Measurements or observations		Test result
		#01		
	No-load current harmonic measurement (entrusted) Ambient air temperature: (+5 ~ +40°C) Humidity: (%) Gas pressure: (pa)	#01		Provide data
		12		
		61		
		88870		
		CH-A THD=0.057		
	Measuring points	In(A)	In/II(%)	
	1	3.01	100.00	
	2	0.02	0.65	
	3	0.03	0.87	
	4	0.00	0.00	
	5	0.03	0.75	
	6	0.01	0.54	
	7	0.01	0.52	
	8	0.01	0.50	
	9	0.005	0.14	
	10	0.00	0.00	
	11	0.00	0.00	
	12	0.00	0.00	
	13	0.00	0.00	
	14	0.00	0.00	
	15	0.00	0.00	
	16	0.00	0.00	
	17	0.00	0.00	
	18	0.00	0.00	
	19	0.00	0.00	

Clause	Test items and requirements	Measurements or observations		Test result
		#01		
	No-load current harmonic measurement (entrusted)	CH-B THD=0.061		Provide data
	Measuring points	In(A)	In/II(%)	
	1	3.00	100.00	
	2	0.02	0.62	
	3	0.03	0.84	
	4	0.00	0.00	
	5	0.03	0.72	
	6	0.01	0.52	
	7	0.01	0.50	
	8	0.01	0.48	
	9	0.03	0.10	
	10	0.00	0.00	
	11	0.00	0.00	
	12	0.00	0.00	
	13	0.00	0.00	
	14	0.00	0.00	
	15	0.00	0.00	
	16	0.00	0.00	
	17	0.00	0.00	
	18	0.00	0.00	
	19	0.00	0.00	

Clause	Test items and requirements	Measurements or observations		Test result
		#01		
	No-load current harmonic measurement (entrusted)			Provide data
	Measuring points	CH-C THD=0.058		
		In(A)	In/II(%)	
	1	3.00	100.00	
	2	0.02	0.61	
	3	0.03	0.85	
	4	0.00	0.00	
	5	0.03	0.73	
	6	0.01	0.53	
	7	0.01	0.51	
	8	0.01	0.49	
	9	0.004	0.12	
	10	0.00	0.00	
	11	0.00	0.00	
	12	0.00	0.00	
	13	0.00	0.00	
	14	0.00	0.00	
	15	0.00	0.00	
	16	0.00	0.00	
	17	0.00	0.00	
	18	0.00	0.00	
	19	0.00	0.00	

Clause	Test items and requirements	Measurements or observations		Test result	
		#01			
GB/T1094.3-2017 13、14 IEC60076-3:2000 clause 13、14	Lightning impulse test (type)			Qualified	
	Ambient air temperature: (+5°C ~ +40°C)	12			
	Humidity: (%)	59			
	Gas pressure: (pa)	88870			
	Applied voltage: full wave 200 ^{±3%} kV chopped wave 220 ^{±3%} kV				
	Applied position		Applied voltage (kV)		Oscillogram No.
	Tap position	Withstand terminals			
	3	A	50% full wave voltage		DG19121066-100-001
			100% full wave voltage		DG19121066-200-002
			50% chopped wave voltage		DG19121066-110-003
100% chopped wave voltage			DG19121066-220-004		
100% chopped wave voltage			DG19121066-220-005		
100% full wave voltage			DG19121066-200-006		
100% full wave voltage			DG19121066-200-007		

Clause	Test items and requirements		Measurements or observations		Test result
			#01		
GB/T1094.3-2017 13、14 IEC60076-3:2000clause13、14	Lightning impulse test (type)				Qualified
	Applied position		Applied voltage (kV)	Oscillogram No.	
	Tap position	Withstand terminals			
	3	B	50% full wave voltage	DG19121066-100-008	
			100% full wave voltage	DG19121066-200-009	
			50% chopped wave voltage	DG19121066-110-010	
			100% chopped wave voltage	DG19121066-220-011	
			100% chopped wave voltage	DG19121066-220-012	
			100% full wave voltage	DG19121066-200-013	
			100% full wave voltage	DG19121066-200-014	
		C	50% full wave voltage	DG19121066-100-015	
			100% full wave voltage	DG19121066-200-016	
			50% chopped wave voltage	DG19121066-110-017	
			100% chopped wave voltage	DG19121066-220-018	
			100% chopped wave voltage	DG19121066-220-019	
			100% full wave voltage	DG19121066-200-020	
			100% full wave voltage	DG19121066-200-021	

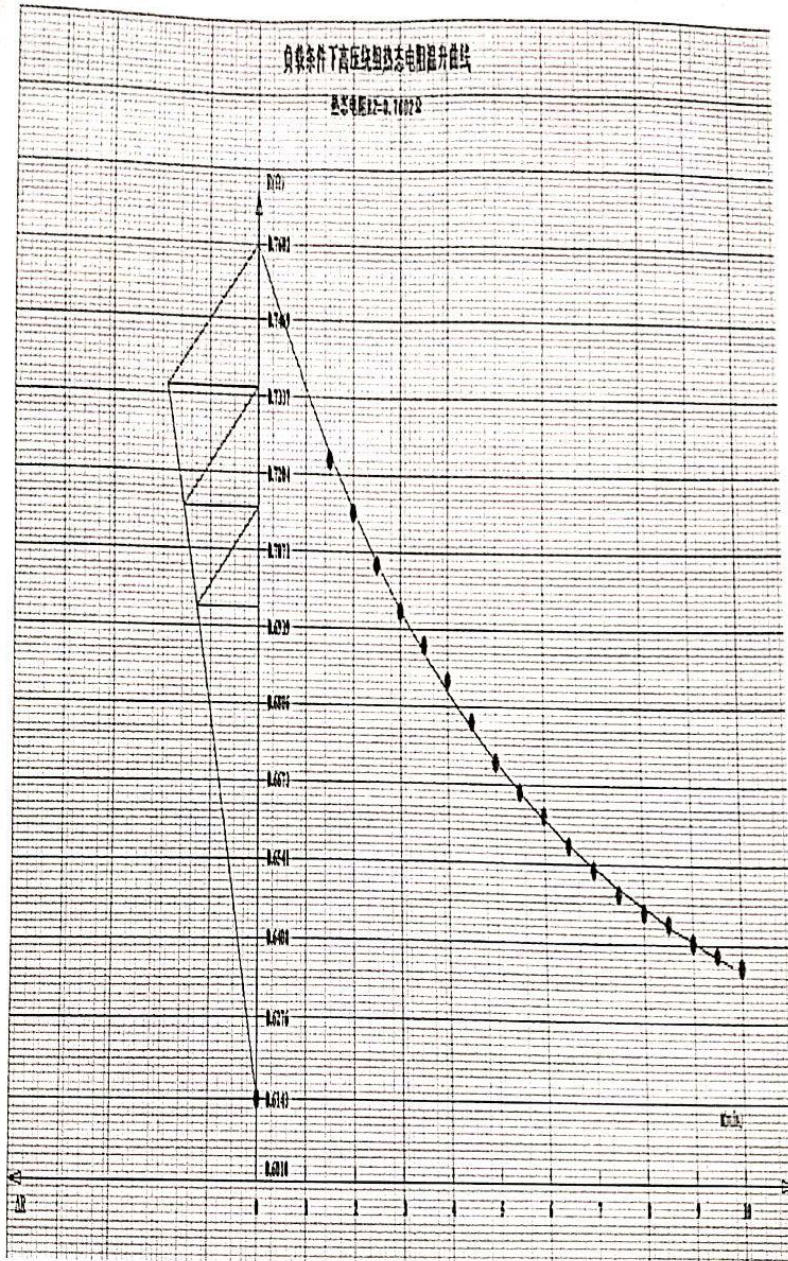


Figure 1

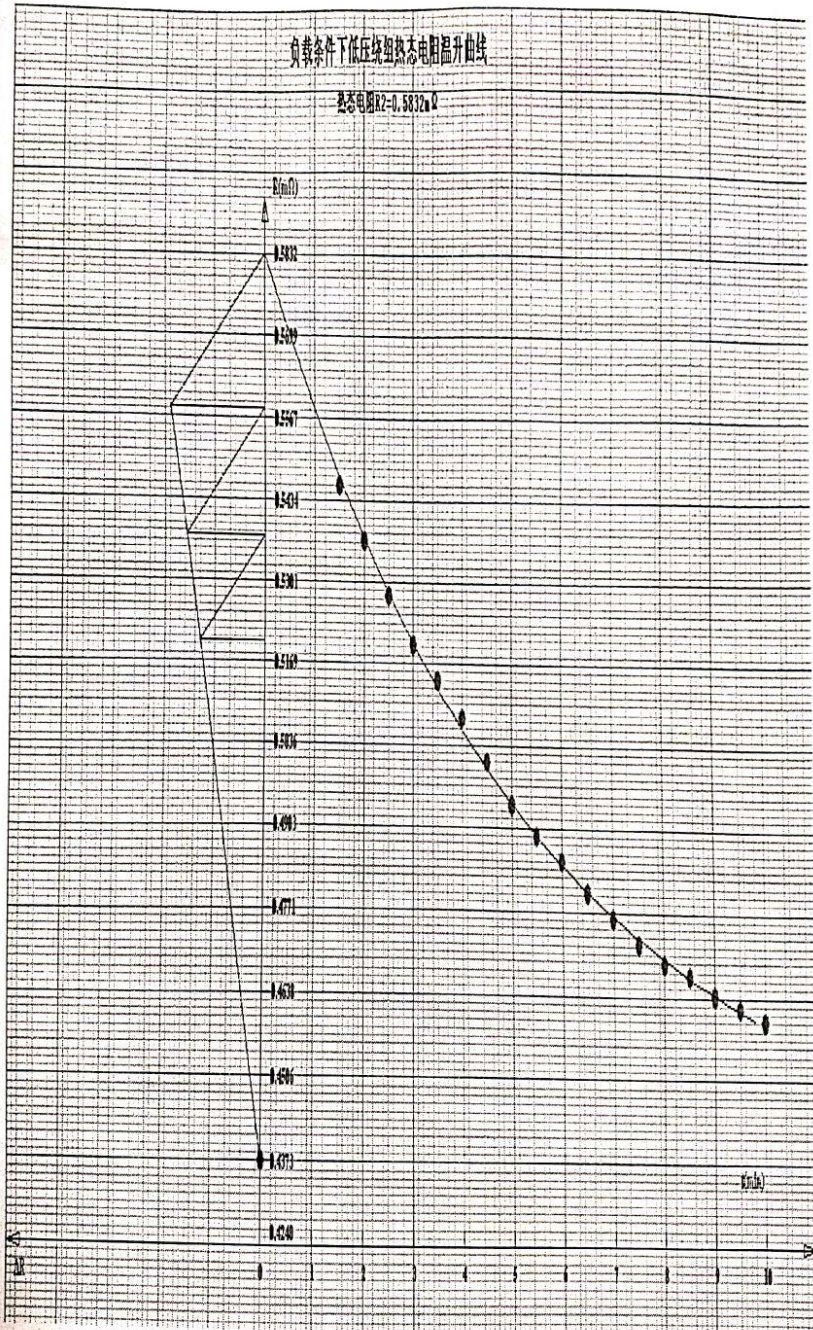


Figure 2

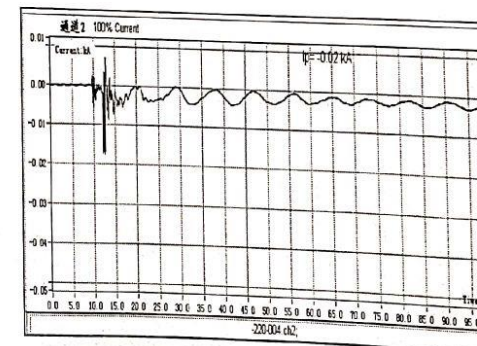
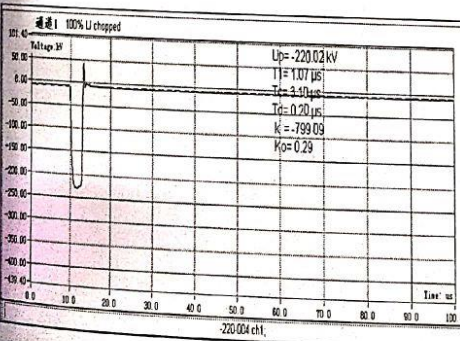
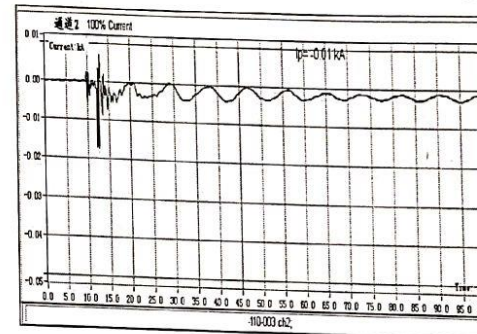
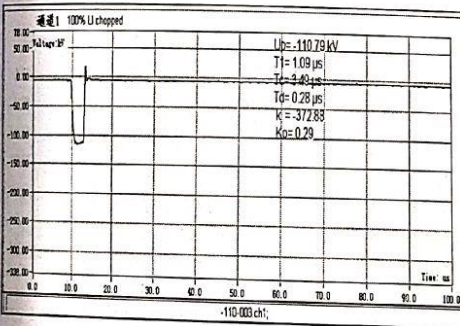
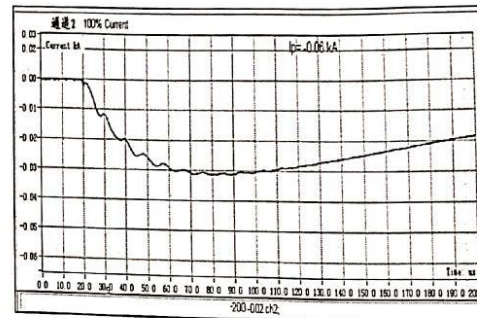
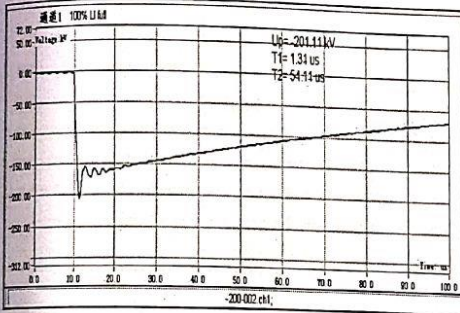
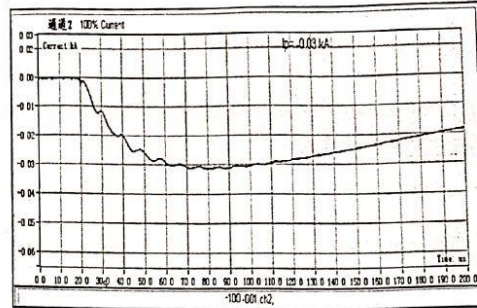
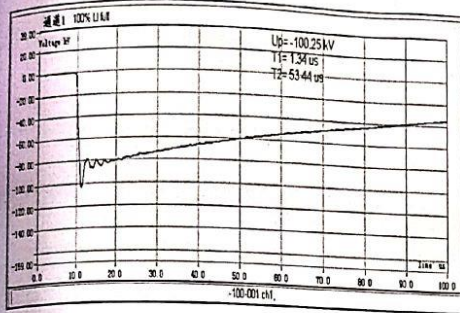
Impulse oscillogram

Report No.: DG19121066

A phase applied voltage

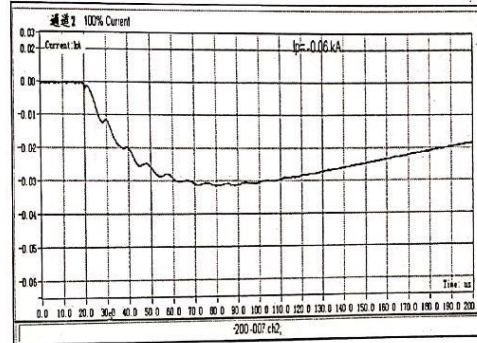
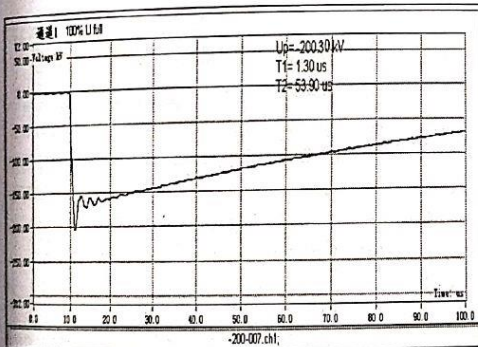
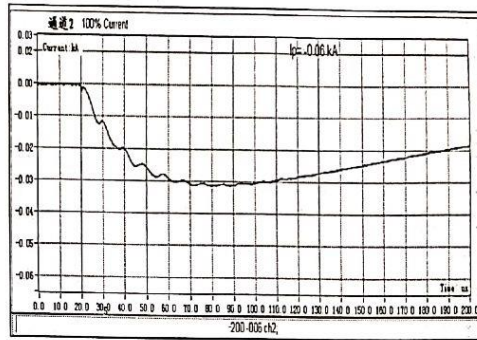
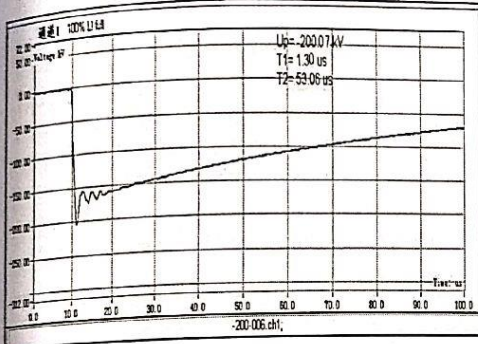
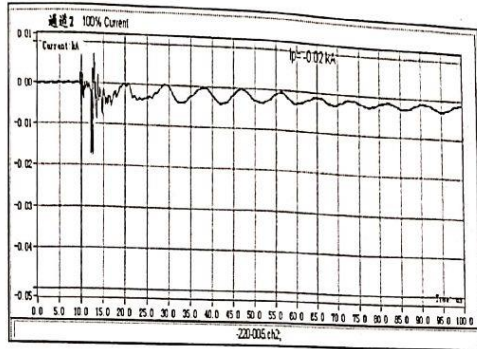
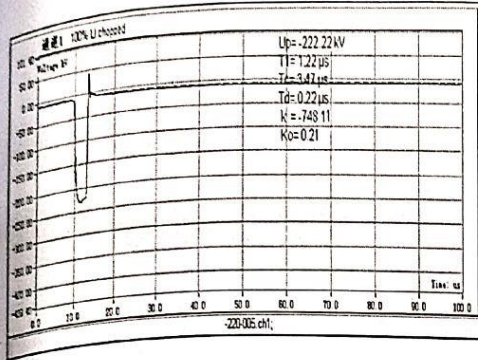
Channel 1: voltage

Channel 2: Impulse current



Impulse oscillogram

Report No.: DG19121066



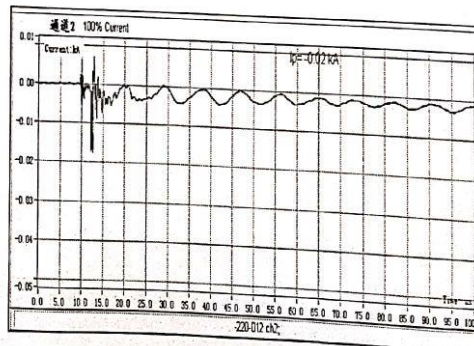
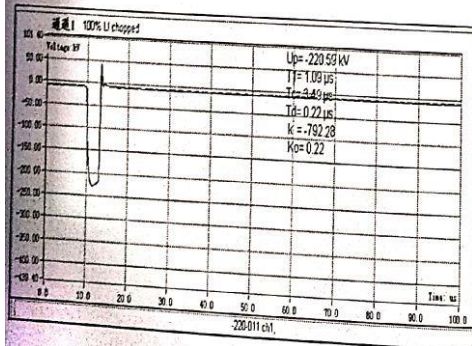
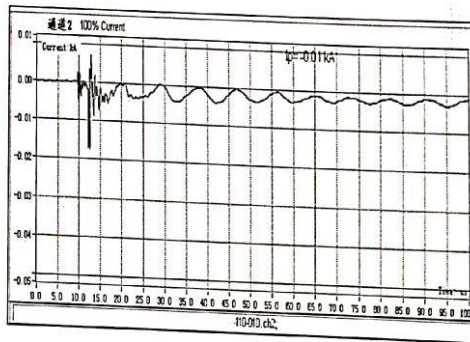
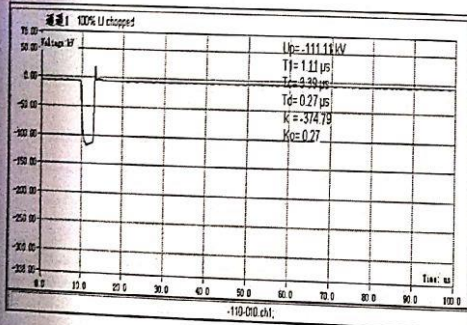
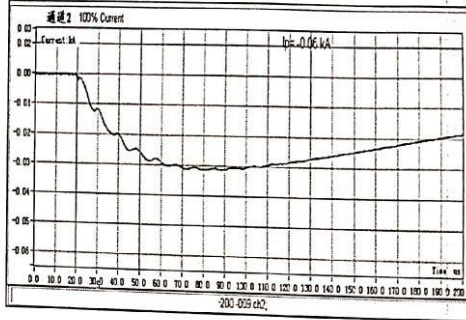
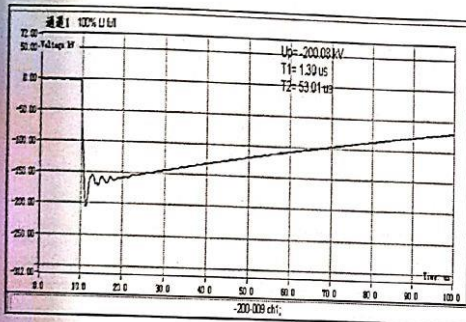
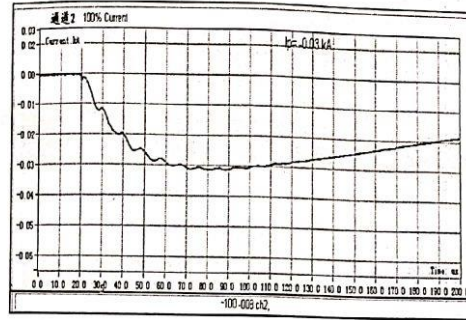
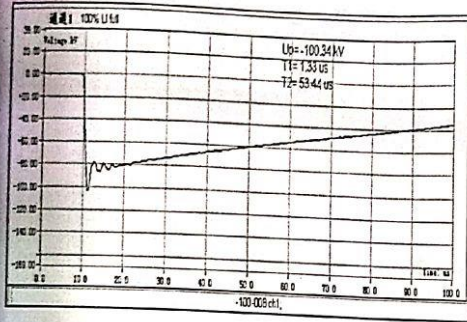
Impulse oscillogram

Report No.: DG19121066

B phase applied voltage

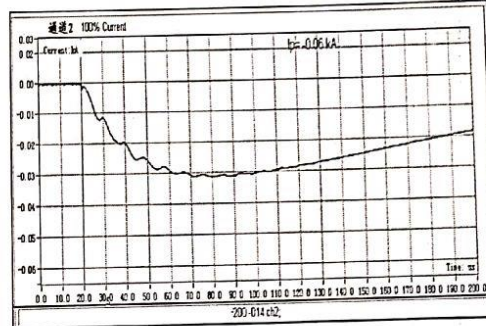
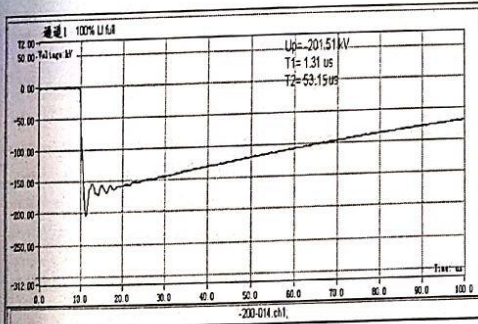
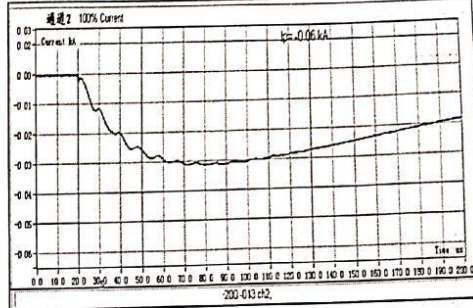
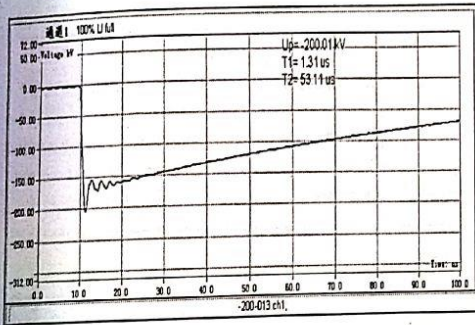
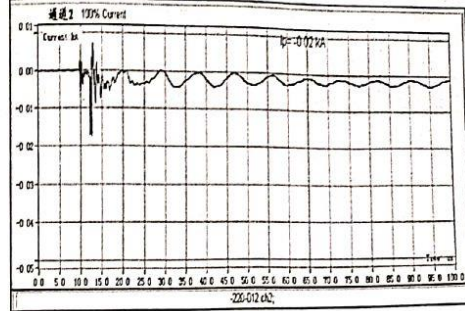
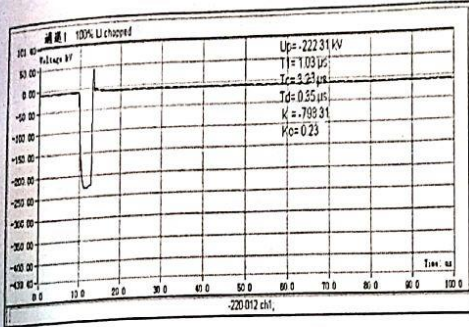
Channel 1: voltage

Channel 2: Impulse current



Impulse oscillogram

Report No.: DG19121066



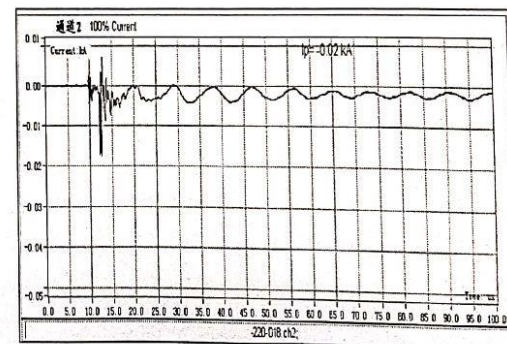
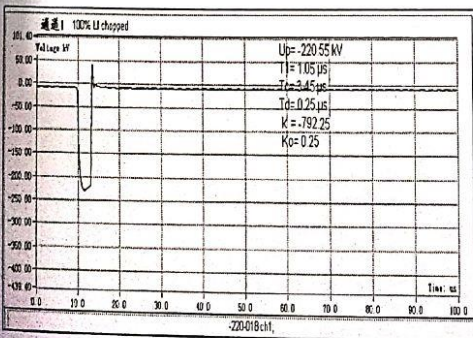
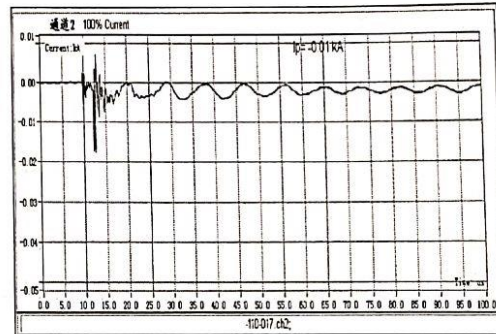
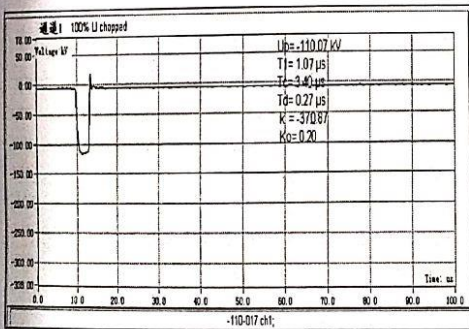
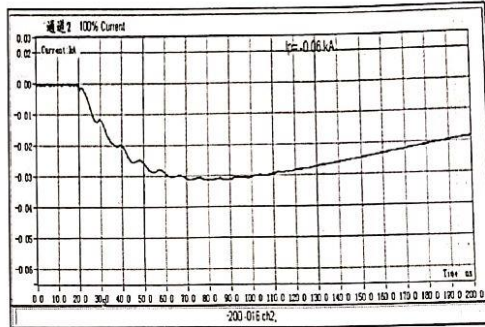
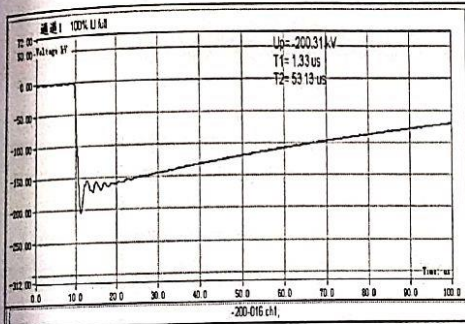
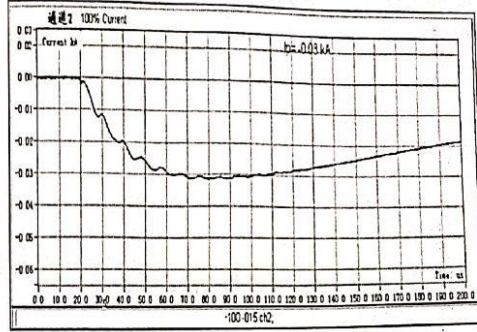
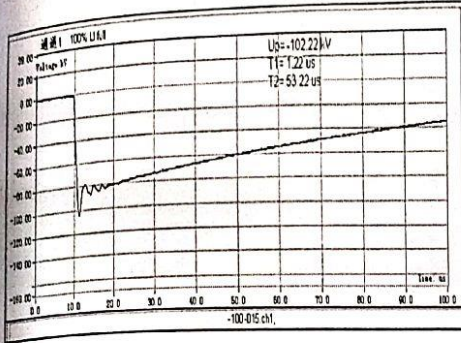
Impulse oscillogram

Report No.: DG19121066

C phase applied voltage

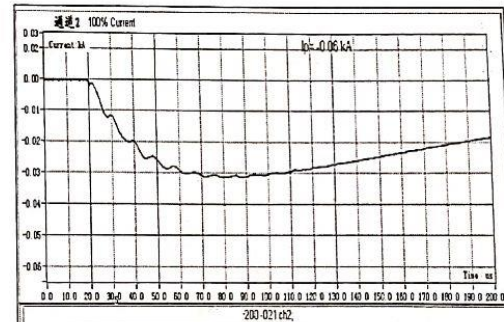
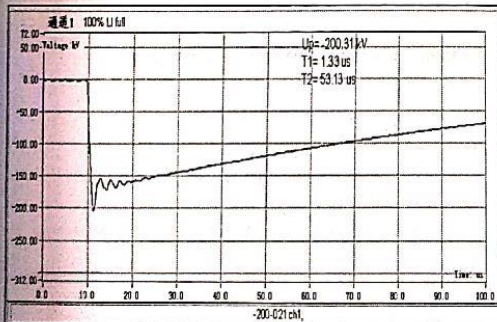
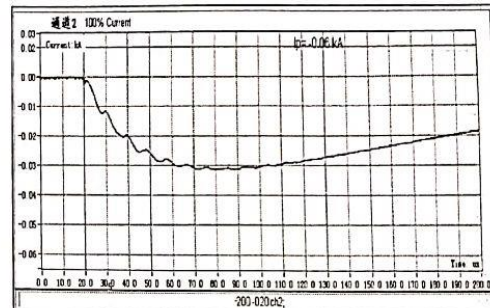
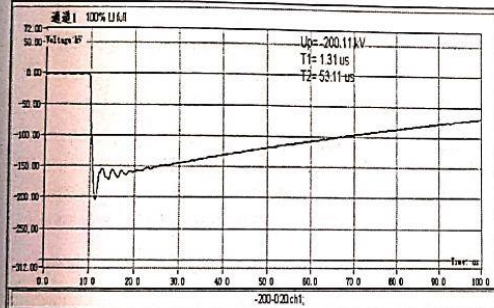
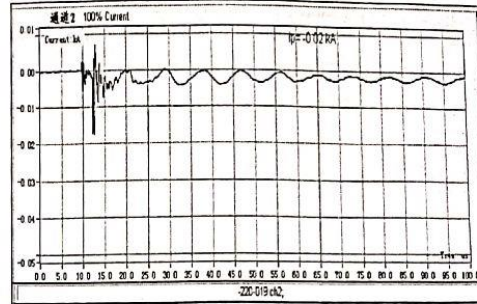
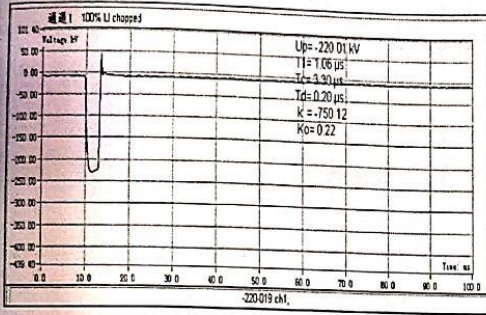
Channel 1: voltage

Channel 2: Impulse current



Impulse oscillogram

Report No.: DG19121066



Test wiring schematic

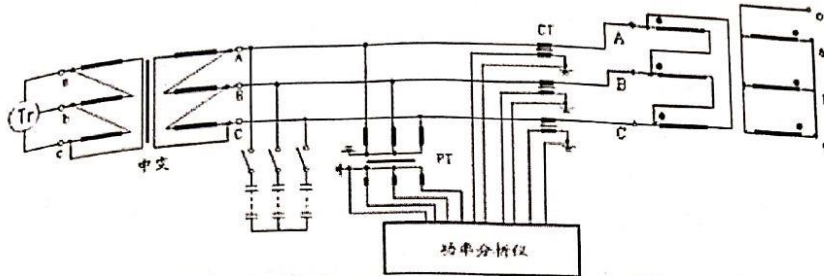


Figure 1 Schematic diagram of three-phase transformer load wiring

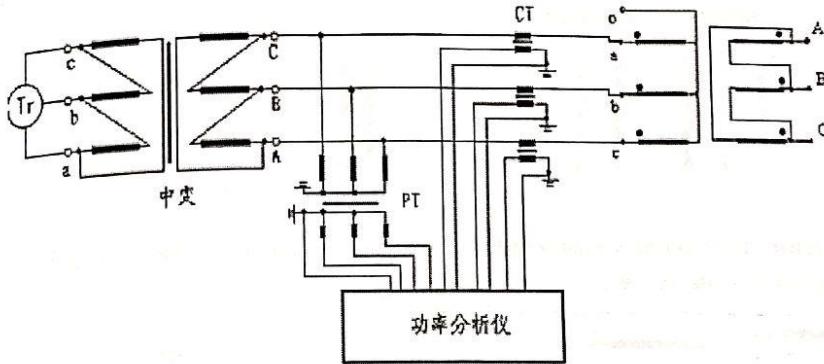


Figure 2 Schematic diagram of three-phase transformer no-load wiring

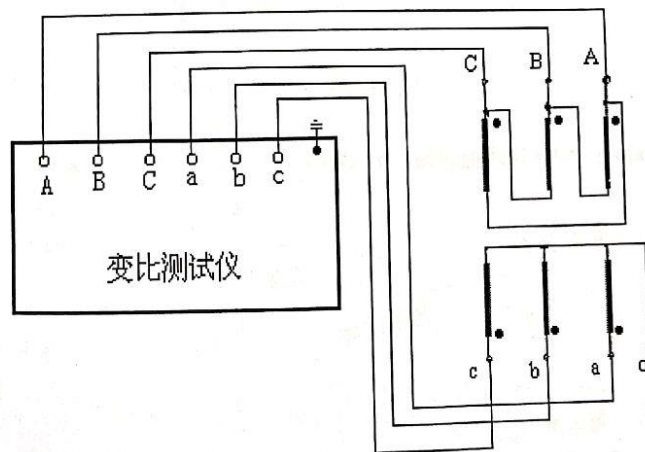
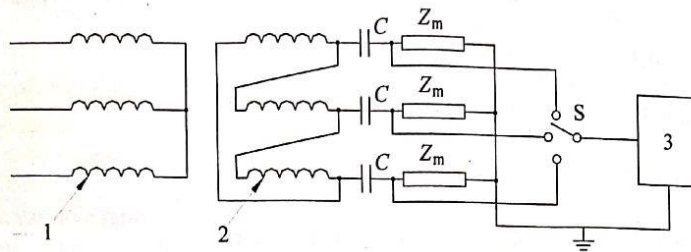


Figure 3 Schematic diagram of three-phase transformer voltage ratio measurement wiring

Test wiring schematic



1- low voltage winding; 2 - high voltage winding, D or Y connection; 3 - measuring instrument; S - switch.

Figure 4 Schematic diagram of wiring of partial discharge test of three-phase transformer

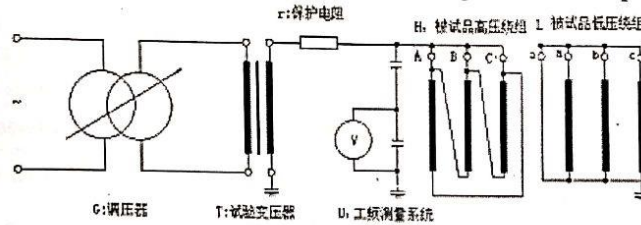


Figure 5 Schematic diagram of external applied voltage withstand test wiring

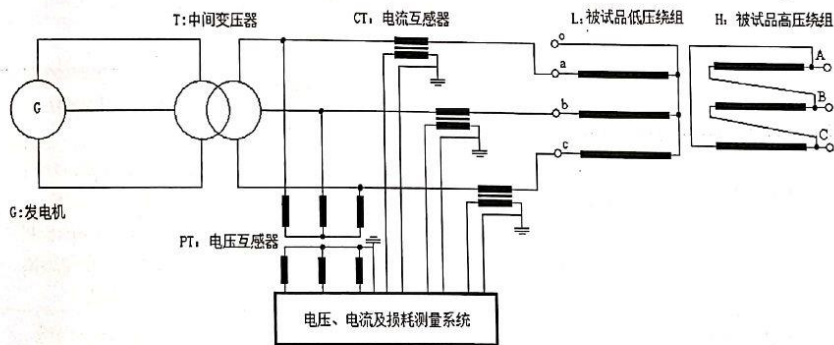


Figure 6 Induction withstand voltage test wiring diagram

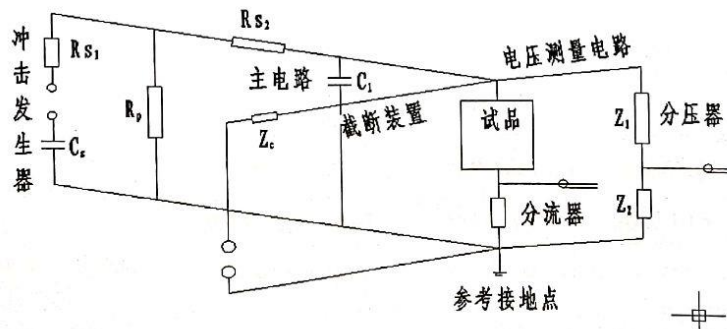


Figure 7 Schematic diagram of the impact test wiring

List of test instruments and equipment

No.	Name	Type	Serial No.	Validity of the calibration	This time use (✓)
1	Automatic oil tester	SH21A	CA-500	2020.5.2	✓
2	Insulating oil dielectric loss tester	XHYS101A	CA501	2020.6.23	✓
3	Insulation Resistance Tester	UT513	ER-075	2020.6.7	✓
4	Automatic variable ratio group tester	SH15- I I I	ER-516	2020.5.2	✓
5	DC resistance fast tester	SH11-40	ER-515	2020.4.19	✓
6	Power frequency withstand voltage test device	YDTW-100kVA/150 kV	SSM-099	2020.10.5	✓
7	Microcomputer controlled transformer test system	SYBS-3	GSM-113	/	✓
8	IF generator set	BPW5-250/200	SSM-101	/	✓
9	Isolation transformer	SG-200/0.8	TSM-102	/	✓
10	Data collector	34972A	TT-514	2020.9.11	✓
11	Power analyzer	WT500	EP-011	2020.6.7	✓
12	Precision voltage transformer	HLB20-20G3 0.05 24.3/ $\sqrt{3}$ kV/ 100/ $\sqrt{3}$ V	GSM-109-01 02 03	2021.3.16	✓
13	Precision current transformer	HJB20-04G3 0.05 50.4A/5A	GSM-109-04 05 06	2021.3.16	✓
14	Nitrogen tank and pressure reducing device	/	J-YLGJ-001	/	✓
15	Pressure gauge	Y100-N	FP-047	2020.10.10	✓
16	Pressure gauge	Y120	FP-048、 FP-049、 FP-050	2020.10.23	✓
17	Digital collector	34972A	TT-514	2020.9.11	✓
18	Voltage regulator	TSA-315kVA 0.38/0-0.69kV	TSM-103	/	✓
19	Precision pulse sound level meter	AWA-5661	SN-501	2020.5.7	✓
20	Regulator	SGD400kV/20kJ	SSM-103	2020.10.5	✓
21	Precision pulse sound level meter	YSS9-800/20	TSM-104	/	✓
22	Digital temperature display	SHII-40	ER-515	2020.4.19	✓
	End of the report				✓