

ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION

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TEST REPORT

Sheet 1 of 16

NAME & ADDRESS OF THE CUSTOMER CROMPTON GREAVES LIMITED SWITCHGEAR COMPLEX, S3 DIVISION, A-3, MIDC, AMBAD, NASIK - 422 010	TEST REPORT NO.: LSWG/2911 DATE: 11/03/2011		
	CUSTOMER REF. NO.	DATED	
	Nil	16/12/2010	
	DATE OF SAMPLE RECEIPT	DATE OF TESTING	
	07/01/2011	07/01/2011 to 25/01/2011	
SAMPLE DESCRIPTION 145kV SF6 GAS CIRCUIT BREAKER (SPRING CLOSING - SPRING OPENING) Rated voltage : 145kV Rated normal current : 3150 A Rated frequency : 50 Hz No. of poles : 3 Quantity (Tested) : 1 No. Further details as per sheet 2 of 16	SAMPLE IDENTIFICATION ERDA sample code no. : PLV-1186/01 Type designation: 120-SFM-32B Sr. No. : 32381C Manufacturer's name: M/s. Crompton Greaves Limited, Nasik Drawing No.: i) 3949604 R0 ii) 4949638 (Rev. 0) (Total 2 sheets)		
TEST DETAILS (Sub-contracted) 1.0 Mechanical operation test at ambient air temperature (Class M1) (Cl. No. 6.101.2) 2.0 Temperature rise test of the Auxiliary and control equipment (Cl.No. 6.5.5) (Further details as per sheet 3 of 16) ENCLOSURE: 1) Oscillogram No. : 1186/01/01 to 18 (Total 18 Nos.) 2) Photograph No. : 1186/01/A & B 3) Drawing No. : i) 3949604 R0 ii) 4949638 (Rev. 0) (Total 2 Sheets) REMARKS: Sample conforms to the requirement of the standard for the mechanical operation test at ambient air temperature (Class M1).		TEST SPECIFICATION IEC 62271 - 100: 2008	
 Prepared By		 Checked By	
 Approved By			

- Note:**
1. This report relates only to the particular sample tested in good condition received by ERDA at Crompton Greaves Limited, Nasik.
 2. This report can not be reproduced in part under any circumstances
 3. Publication of this report requires prior permission in writing from Director, ERDA.
 4. Only the tests asked for by the customer have been carried out.

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Date: 11/03/2011

TECHNICAL SPECIFICATION ASSIGNED BY THE CUSTOMER:

145 kV SF6 GAS CIRCUIT BREAKER (SPRING CLOSING – SPRING OPENING)

1. Reference standard	: IEC 62271-100: 2008
2. Manufacturer's name	: M/s. Crompton Greaves Ltd., Nasik
3. Type designation	: 120-SFM-32B
4. Serial no.	: 32381C
5. Rated voltage	: 145 kV
6. Rated normal current	: 3150 A
7. No. of pole	: 3
8. Rated frequency	: 50 Hz
9. Rated power frequency withstand voltage	: 275 kVrms
10. Rated lightning impulse withstand voltage	: 650 kVp
11. Rated short circuit breaking capacity	: 40 kA rms
12. Rated short circuit making capacity	: 100 kAp
13. Rated short time withstand current & its duration	: 40 kA rms for 3 seconds
14. Rated control supply voltage of closing device	: 110 V dc
15. Rated control supply voltage of tripping device	: 110 V dc
16. Rated voltage of the motor	: 125 Vac/dc
17. Rated maximum pressure of SF6 gas for interruption	: 7.0 Kg / cm ² (g) at 20 ° C
18. Rated minimum pressure of SF6 gas for interruption	: 6.0 Kg / cm ² (g) at 20 ° C
19. Rated operating sequence	: O- 0.3Sec. - CO - 3 Min. - CO
20. Operating mechanism	: Type BM – spring closing – Spring opening
21. Time – Speed parameters (Declared by the manufacturer)	:
- Closing time (millisecond)	: 80 to 110
- Contact mismatch (millisecond)	: ≤ 5 (Between pole)
- Opening time (millisecond)	: 20 to 34
- Contact mismatch (millisecond)	: ≤ 3.3 (Between pole)
- CO operation time (millisecond)	: ≤ 60
22. Contact resistance of the main circuit	: ≤ 37 micro-ohms
23. SF6 Gas leakage limit at each joint (for proving gas tightness)	: 10 ppm (Maximum)
24. Insulation class of closing coil	: F
25. Insulation class of tripping coil	: F
26. Insulation class of motor	: E

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TEST DETAILS: (Sub-contracted)

Clause No.

1.0 Mechanical operation test at ambient air temperature (Class M1)

6.101.2

1.1 Dielectric test on main circuit
(Before mechanical operations test)

7.1

1.2 Condition of the auxiliary and control equipment
during and after the tests.
(Before mechanical operations test)

6.101.1.5

1.3 Characteristics and settings of the circuit breaker
to be recorded before and after the tests.
(Before mechanical operations test)

6.101.1.3

1.4 Mechanical operation test at ambient air
temperature (Class M1)

6.101.2

1.5 Characteristics and settings of the circuit breaker
to be recorded before and after the tests.
(After mechanical operations test)

6.101.1.3

1.6 Condition of the circuit breaker during and
after the tests.

6.101.1.4

1.7 Condition of the auxiliary and control equipment
during and after the tests.

6.101.1.5

2.0 Temperature rise tests of the Auxiliary and control equipment

6.5.5


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TEST RESULTS:

Sr. No.	Particulars of the tests & Clause No.	Requirements as per Specifications	Obtained Value	Remarks
1.0	Mechanical operation test at ambient air temperature (Class M1) (Cl. No. 6.101.2)			Conforms
1.1	Dielectric test on the main circuit (Cl. No. 7.1) (Before Mechanical operation test)			Conforms
	Test voltage applied (Power frequency) (kVrms)	275	275	
	Test duration (minute)	1.0	1.0	
	Minimum SF6 Gas pressure	-----	6.0 Kg/cm2 at 23°C	
	Test results to be obtained	No flashover or breakdown shall occur.	No flashover or breakdown occurred.	
1.2	Condition of the auxiliary and control equipment during and after the tests (Cl. No. 6.101.1.5) (Before Mechanical Operation test)			Conforms
	Test voltage applied (Power frequency) (kVrms) (As per Cl. No. 6.2.10 of IEC 62271-1-2007)	2.0	2.0	
	Test duration (minute)	1.0	1.0	
	Test results to be obtained	No flashover or break down shall occur.	No flashover or break down occurred.	


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Date: 11/03/2011

Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
1.3	Characteristics and settings of the circuit breaker to be recorded before and after the test (Cl. No. 6.101.1.3) (Before mechanical operations test) Reference ambient air temperature (°C) 1) Rated supply voltage - For Closing coil (DC) - For Tripping coil (DC) - For spring charging motor (AC) - Closing time (millisecond) R - Pole Y - Pole B - Pole - Closing pole discrepancy (millisecond) Oscillogram No. - Opening time (millisecond) R - Pole Y - Pole B - Pole - Opening pole discrepancy (millisecond) Oscillogram No. - CO time (millisecond) R - Pole Y - Pole B - Pole Oscillogram No. - Spring charging time of motor (second) - Spring charging motor current (A Max) No. of operations (Cl. No. 6.101.2.5)	 ----- 100% of 110V 100% of 110V 100% of 125V 80 - 110 80 - 110 80 - 110 ≤ 5.0 --- 20 - 34 20 - 34 20 - 34 ≤ 3.3 --- ≤ 60 ≤ 60 ≤ 60 --- --- 5	 21.6 110 V 110 V 125 V 96.10 94.40 95.50 1.70 1186/01/01 25.50 26.00 25.90 0.50 1186/01/02 36.50 38.80 37.20 1186/01/03 9.92 6.25 5 Completed	Conforms

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Date: 11/03/2011

Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
	2) Maximum supply voltage			
	- For Closing coil (DC)	110% of 110 V	121 V	
	- For Tripping coil (DC)	110% of 110 V	121 V	
	- For spring charging motor (AC)	110% of 125 V	137.5 V	
	- Closing time (millisecond)			
	R - Pole	80 - 110	94.50	
	Y - Pole	80 - 110	92.90	
	B - Pole	80 - 110	93.90	
	- Closing pole discrepancy (millisecond)	≤ 5.0	1.60	
	Oscillogram No.	---	1186/01/04	
	- Opening time (millisecond)			
	R - Pole	20 - 34	24.90	
	Y - Pole	20 - 34	25.40	
	B - Pole	20 - 34	25.30	
	- Opening pole discrepancy (millisecond)	≤ 3.3	0.50	
	Oscillogram No.	---	1186/01/05	
	- CO time (millisecond)			
	R - Pole	≤ 60	36.80	
	Y - Pole	≤ 60	39.00	
	B - Pole	≤ 60	37.50	
	Oscillogram No.	---	1186/01/06	
	- Spring charging time of motor (second)	---	8.94	
	- Spring charging motor current (A Max)	---	6.29	
	No. of operations (Cl. No. 6.101.2.5)	5	5 Completed	

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Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
	3) Minimum supply voltage			
	- For Closing coil (DC)	85% of 110 V	93.5 V	
	- For Tripping coil (DC)	70% of 110 V	77 V	
	- For spring charging motor (AC)	85% of 125 V	106.2 V	
	- Closing time (millisecond)			
	R - Pole	80 - 110	98.00	
	Y - Pole	80 - 110	96.40	
	B - Pole	80 - 110	97.50	
	- Closing pole discrepancy (millisecond)	≤ 5.0	1.60	
	Oscillogram No.	---	1186/01/07	
	- Opening time (millisecond)			
	R - Pole	20 - 34	28.70	
	Y - Pole	20 - 34	29.30	
	B - Pole	20 - 34	29.10	
	- Opening pole discrepancy (millisecond)	≤ 3.3	0.60	
	Oscillogram No.	---	1186/01/08	
	- CO time (millisecond)			
	R - Pole	≤ 60	37.50	
	Y - Pole	≤ 60	40.00	
	B - Pole	≤ 60	38.30	
	Oscillogram No.	---	1186/01/09	
	- Spring charging time of motor (second)	---	13.05	
	- Spring charging motor current (A Max)	---	6.32	
	No. of operations (Cl. No. 6.101.2.5)	5	5 Completed	

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Sr. No	Particulars of the tests & Clause No.	Requirements as per Specifications	Obtained Value	Remarks
	4) SF6 gas pressure	7.0 Kg/cm ² at 20°C	7.1 Kg/cm ² at 22°C	
	5) Power consumption of control circuit			
	- Resistance of closing coil	-----	19.4 Ω	
	- Power consumption of closing coil	-----	623.71 W	
	- Resistance of Tripping coil - 1	-----	19.5 Ω	
	- Power consumption of tripping coil- 1	-----	620.51 W	
	- Resistance of Tripping coil - 2	-----	19.3 Ω	
	- Power consumption of tripping coil-2	-----	626.94 W	
	6) Tightness Test			
	Gas leakage measured of complete system which includes all pole joints, pole gear box (which includes all casting & casting joints, pipe end connection), NRV joint, manometer joint.			
	Electron capture detector was used for leakage measurement			
	Time for stabilization 3 hours.			
	-SF6 Gas pressure	7.0 Kg/cm ² at 20°C	7.1 Kg/cm ² at 21.0°C	
	-Complete system gas leakage acceptable rate/ joint (For proving gas tightness)	* ≤ 10 ppm	No Leakage was found	
	(* Declared by the manufacturer)			
	7) Rated operating sequence (One operation performance)	O - 0.3 Sec.- CO - 3 Min. - CO	O - 0.3 Sec.- CO - 3 Min. - CO completed	
	8) Measurement of the resistance of the main circuit (Before Mechanical Operation Test)			
	Reference ambient air temperature (°C)	---	35.2	
	Test current (A DC)	50 3150	100	
	- Contact Resistance measured (micro-ohms)			
	R - Pole	≤ 37	36.6	
	Y - Pole	≤ 37	33.4	
	B - Pole	≤ 37	34.1	

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Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
1.4	Mechanical Operation Test At Ambient Air Temperature (Class M1) (Cl. No. 6.101.2) The circuit breaker was mounted as in Photograph no.: 1186/01/A during test. Ambient air temperature (°C) Total no. of operations 1) Operating sequence t_a (Seconds) (*Specified by the manufacturer) Rated supply voltage For Closing Coil (V DC) For Tripping Coil (V DC) For Spring charging motor (V AC) No. of Operating sequence Maximum supply voltage For Closing Coil (V DC) For Tripping Coil (V DC) For Spring charging motor (V AC) No. of Operating sequence Minimum supply voltage For Closing Coil (V DC) For Tripping Coil (V DC) For Spring charging motor (V AC) No. of Operating sequence	----- 2000 $C - t_a - O - t_a$ 45 100% of 110 100% of 110 100% of 125 500 110% of 110V 110% of 110V 110% of 125V 500 85% of 110 70% of 110 85% of 125 500	30.5 2000 Completed $C - t_a - O - t_a$ 45 110 V 110 V 125 V 500 completed 121 V 121 V 137.5 V 500 completed 93.5 V 77 V 106.2 V 500 Completed	Conforms

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Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
	2) Operating sequence	O-t-CO-t _a -C-t _a	O-t-CO-t _a -C-t _a	
	- t _a (seconds)	*45	45	
	- t (seconds)	0.3	0.3	
	Rated supply voltage			
	For Closing Coil (V DC)	100% of 110	110	
	For Tripping Coil (V DC)	100% of 110	110	
	For Spring charging motor (V AC)	100% of 125	125	
	No. of operating sequence	250	250 completed	
	Where,			
	O = Opening			
	C = Closing			
	CO = A closing operation followed immediately by an opening operation			
	t _a = Time interval between two operations which is necessary to restore the initial conditions and / or to prevent undue heating of parts of the circuit breaker			
	t = 0.3 Seconds for circuit breaker intended for rapid auto-reclosing			
	(* Specified by the manufacturer)			

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Date: 11/03/2011

Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
1.5	Characteristics and settings of the circuit breaker to be recorded before and after the test (Cl. No. 6.101.1.3) (After mechanical operations test)			Conforms
	Reference ambient air temperature (°C)	----	33.1	
	1) Rated supply voltage			
	- For Closing coil (DC)	100% of 110V	110 V	
	- For Tripping coil (DC)	100% of 110V	110 V	
	- For spring charging motor (AC)	100% of 125V	125 V	
	- Closing time (millisecond)			
	R - Pole	80 - 110	96.60	
	Y - Pole	80 - 110	95.00	
	B - Pole	80 - 110	96.00	
	- Closing pole discrepancy (millisecond)	≤ 5.0	1.60	
	Oscillogram No.	---	1186/01/10	
	- Opening time (millisecond)			
	R - Pole	20 - 34	25.50	
	Y - Pole	20 - 34	26.40	
	B - Pole	20 - 34	26.00	
	- Opening pole discrepancy (millisecond)	≤ 3.3	0.90	
	Oscillogram No.	---	1186/01/11	
	- CO time (millisecond)			
	R - Pole	≤ 60	38.40	
	Y - Pole	≤ 60	40.80	
	B - Pole	≤ 60	39.10	
	Oscillogram No.	---	1186/01/12	
	- Spring charging time of motor (second)	---	10.16	
	- Spring charging motor current (A Max)	---	6.29	
	No. of operations (Cl. No. 6.101.2.5)	5	5 Completed	

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Date: 11/03/2011

Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
	2) Maximum supply voltage			
	- For Closing coil (DC)	110% of 110 V	121 V	
	- For Tripping coil (DC)	110% of 110 V	121 V	
	- For spring charging motor (AC)	110% of 125 V	137.5 V	
	- Closing time (millisecond)			
	R - Pole	80 - 110	95.70	
	Y - Pole	80 - 110	94.10	
	B - Pole	80 - 110	95.20	
	- Closing pole discrepancy (millisecond)	≤ 5.0	1.60	
	Oscillogram No.	---	1186/01/13	
	- Opening time (millisecond)			
	R - Pole	20 - 34	24.90	
	Y - Pole	20 - 34	25.60	
	B - Pole	20 - 34	25.30	
	- Opening pole discrepancy (millisecond)	≤ 3.3	0.70	
	Oscillogram No.	---	1186/01/14	
	- CO time (millisecond)			
	R - Pole	≤ 60	38.20	
	Y - Pole	≤ 60	40.40	
	B - Pole	≤ 60	38.70	
	Oscillogram No.	---	1186/01/15	
	- Spring charging time of motor (second)	---	8.88	
	- Spring charging motor current (A Max)	---	6.30	
	No. of operations (Cl. No. 6.101.2.5)	5	5 Completed	

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Sr. no.	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
	3) Minimum supply voltage			
	- For Closing coil (DC)	85% of 110 V	93.5 V	
	- For Tripping coil (DC)	70% of 110 V	77 V	
	- For spring charging motor (AC)	85% of 125 V	106.2 V	
	- Closing time (millisecond)			
	R - Pole	80 - 110	100.20	
	Y - Pole	80 - 110	98.50	
	B - Pole	80 - 110	99.70	
	- Closing pole discrepancy	≤ 5.0	1.70	
	Oscillogram No.	---	1186/01/16	
	- Opening time (millisecond)			
	R - Pole	20 - 34	28.90	
	Y - Pole	20 - 34	29.50	
	B - Pole	20 - 34	29.30	
	- Opening pole discrepancy (millisecond)	≤ 3.3	0.6	
	Oscillogram No.	---	1186/01/17	
	- CO time (millisecond)			
	R - Pole	≤ 60	38.30	
	Y - Pole	≤ 60	40.50	
	B - Pole	≤ 60	38.90	
	Oscillogram No.	---	1186/01/18	
	- Spring charging time of motor (second)	---	13.03	
	- Spring charging motor current (A Max)	---	6.46	
	No. of operations (Cl. No. 6.101.2.5)	5	5 Completed	

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	4) SF6 gas pressure	7.0 Kg/cm ² at 20°C	7.2 Kg/cm ² at 22.0°C	
	5) Power consumption of control circuit			
	- Resistance of closing coil	-----	19.4 Ω	
	- Power consumption of closing coil	-----	623.71 W	
	- Resistance of Tripping coil - 1	-----	19.5 Ω	
	- Power consumption of tripping coil- 1	-----	620.51 W	
	- Resistance of Tripping coil - 2	-----	19.4 Ω	
	- Power consumption of tripping coil-2	-----	623.71 W	
	6) Tightness Test			
	Gas leakage measured of complete system which includes all pole joints, pole gear box (which includes all casting & casting joints, pipe end connection), NRV joint, manometer joint.			
	Electron capture detector was used for leakage measurement			
	Time for stabilization 3 hours.			
	-SF6 Gas pressure	7.0 Kg/cm ² at 20°C	7.2 Kg/cm ² at 22.0°C	
	-Complete system gas leakage acceptable rate/ joint (For proving gas tightness)	* ≤ 10 ppm	No Leakage was found	
	(* Declared by the manufacturer)			
	7) Rated operating sequence (One operation performance)	O - 0.3 Sec.- CO - 3 Min. - CO	O - 0.3 Sec.- CO - 3 Min. - CO completed	
	8) Measurement of the resistance of the main circuit			
	Reference ambient air temperature (°C)	---	34.0	
	Test current (A DC)	50 3150	100	
	- Contact Resistance measured (micro-ohms)			
	R - Pole	≤ 37	31.0	
	Y - Pole	≤ 37	30.0	
	B - Pole	≤ 37	30.0	

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Test Report No.: LSWG/2911

Sheet 15 of 16

Date: 11/03/2011

Sr. No	Particulars of the tests & Clause No.	Requirements as per specifications	Obtained value	Remarks
1.6	Condition of the circuit breaker during and after the test (Cl. No. 6.101.1.4) i) Across open contacts of each pole (Power frequency) (kV rms) (As per Cl. No. 6.2.11 of IEC 62271-100:2008 & Table1a, column (2) of IEC 62271-1-2007) Test duration (minute) Minimum SF6 Gas pressure Test results to be obtained	Circuit breaker shall be capable of operating normally. All parts of the circuit breaker shall not show any undue wear. # 275 1.0 6.0 Kg/cm2 at 20°C - There shall be no unintentional disruptive discharge during the test.	Circuit breaker was capable of operating normally. All parts of the circuit breaker did not show any undue wear. 275 1.0 6.2 Kg/cm2 at 34.0°C - There was no unintentional disruptive discharge during the test.	Conforms
1.7	Condition of the auxiliary and control equipment during and after the test. (Cl. No. 6.101.1.5) Test voltage applied (Power frequency) (kVrms) (As per Cl. No. 6.2.10 of IEC 62271-1-2007) Test duration (minute) Test results to be obtained (# Specified by the manufacturer)	There shall be no undue wear. The functions of Auxiliary and control equipment shall fulfill as per standard 2.0 1.0 No flashover or breakdown shall occur.	There was no undue wear. The functions of auxiliary and control equipment fulfilled as per standard. 2.0 1.0 No flashover or breakdown occurred.	Conforms

Prepared By

Checked By

0624310

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Sheet 16 of 16

Date : 11/03/2011

Sr. no.	Particulars of the tests & Clause No.	Requirements as per specification	Obtained Value	Remarks
2.0	Temperature-rise tests of the auxiliary and control equipment (Cl. No. 6.5.5) The equipment was tested at its rated supply voltage. All switching devices were equipped with automatic breaking devices for interruption of the auxiliary circuit at the end of the operation. The circuits were energized 10 times, for either 1 second or until the automatic breaking device operated. The interval between the instant of each energizing was the lowest interval possible between two switching operations of the circuit breaker. Before and immediately after this test sequence, the resistance of the internal coils of the equipment was measured.			Conforms
	Ambient air temperature (°C)	10.....40	22	
	Rated Supply voltage			
	- Closing coils	110 Vdc	110 Vdc	
	- Tripping coils	110 Vdc	110 Vdc	
	- Spring Charging Motor	125 Vac	125 Vac	
	Temperature rise limits (°C)			
	- Closing coil	≤ 115	2.7	
	- Tripping coil -1	≤ 115	1.3	
	- Tripping coil -2	≤ 115	1.3	
	- Motor	≤ 85	20.1	

Prepared By

Checked By

0624311

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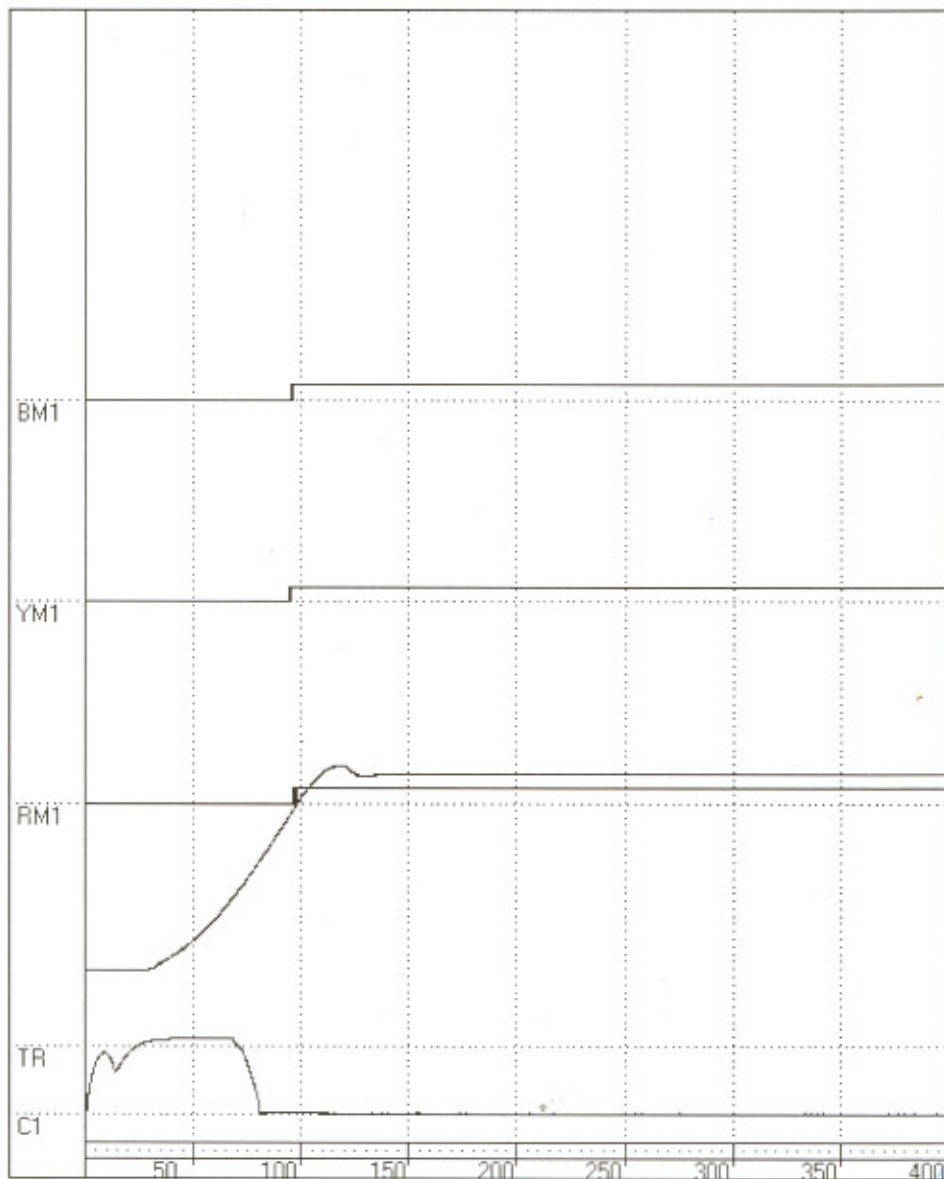
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Test Report No. : LSWG/2911

Date: 11/03/2011



Oscillogram No. 1186/01/01



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Low Voltage Products Division
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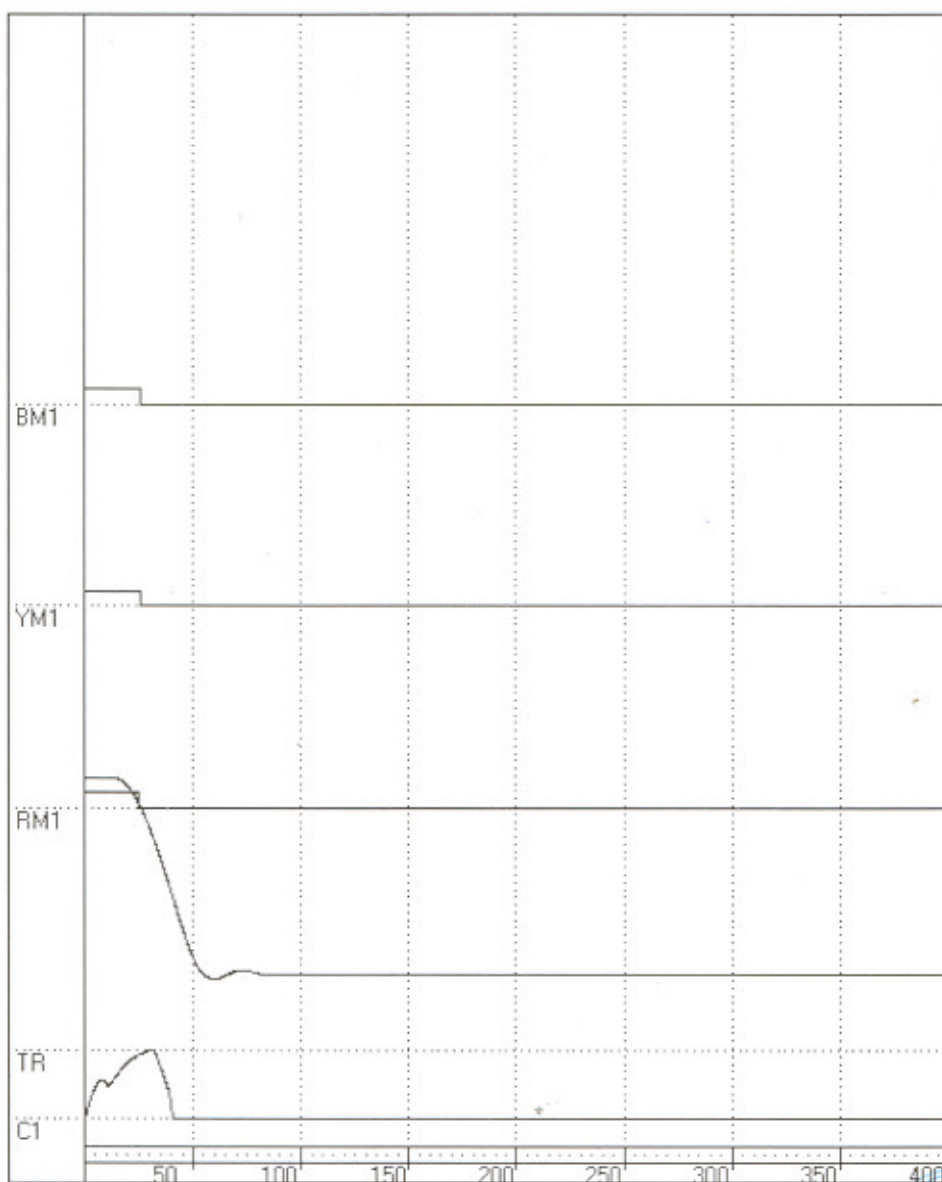
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/02



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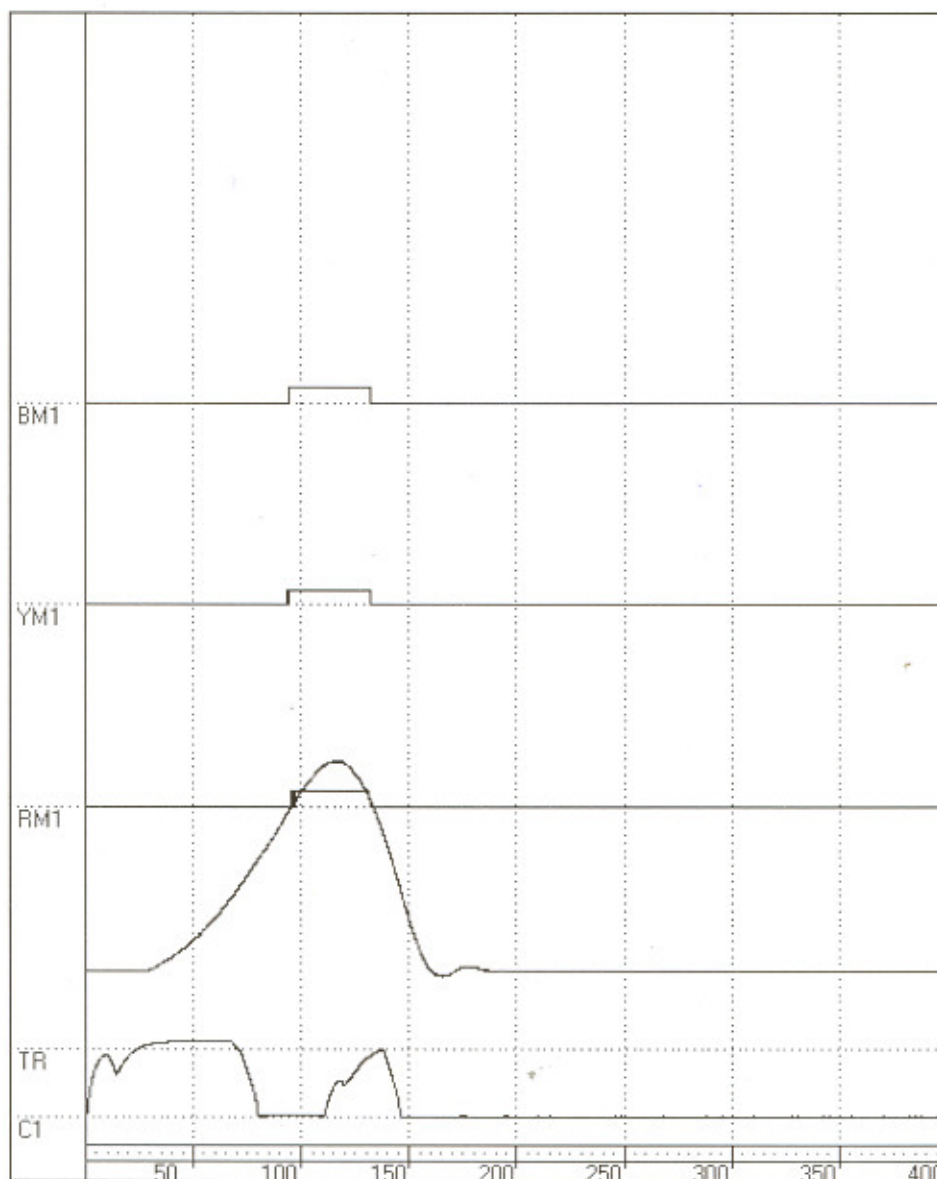
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/03



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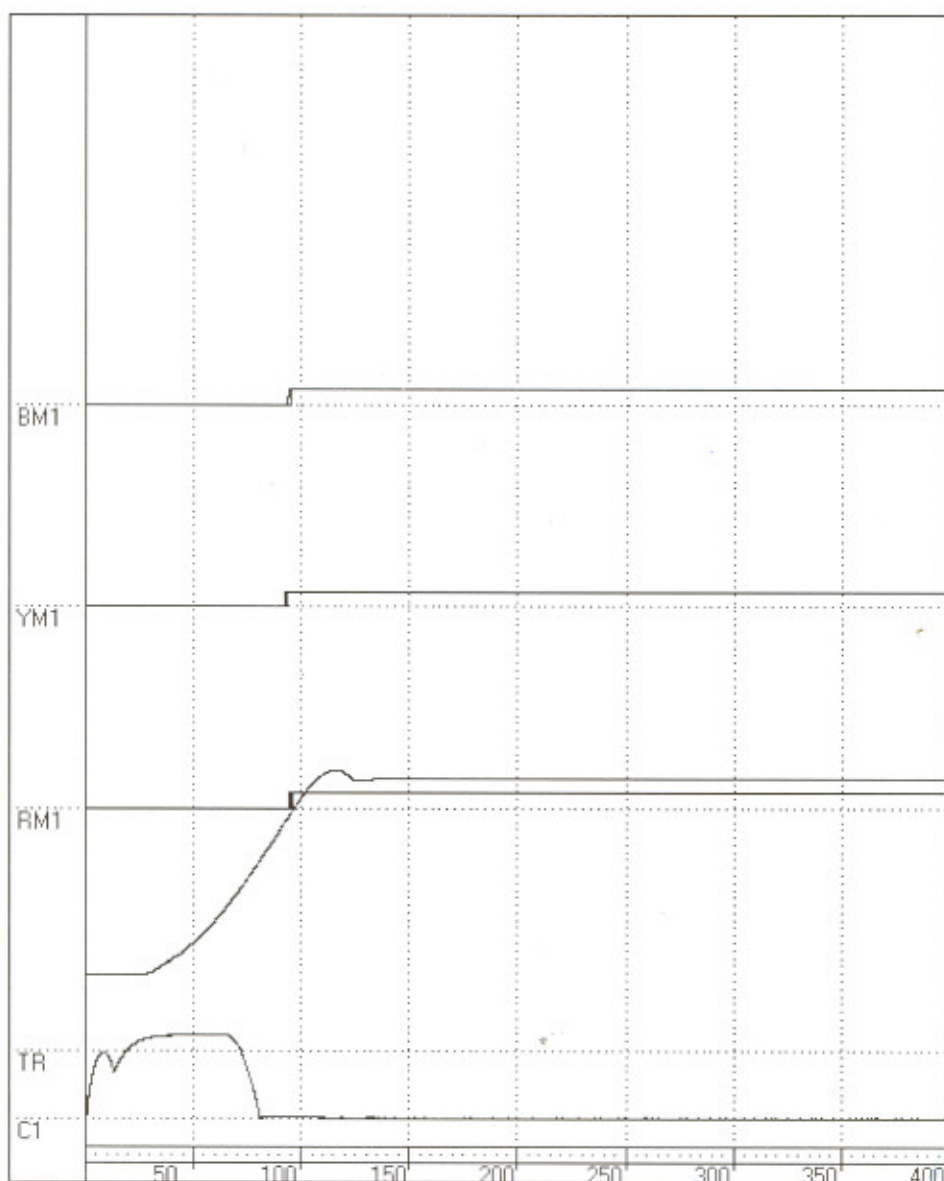
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/04



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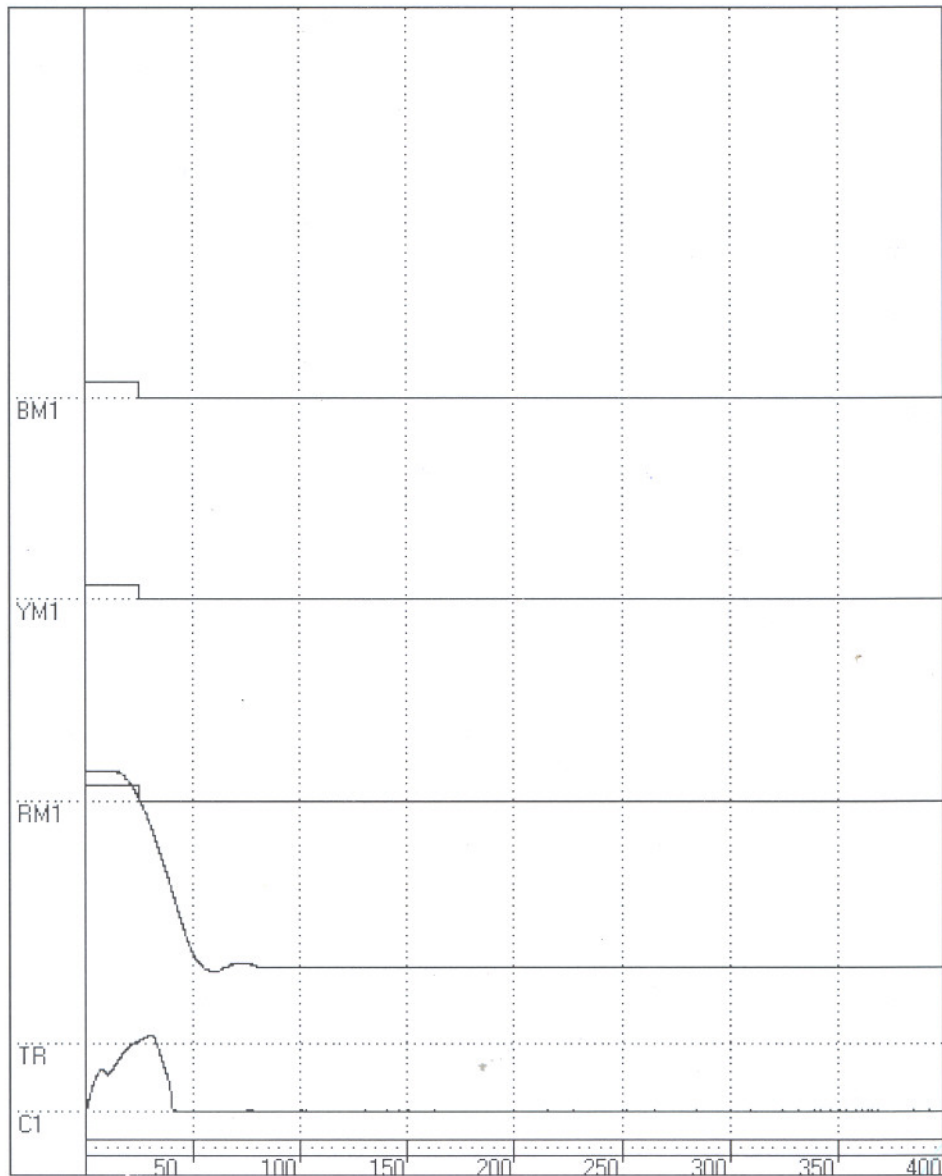
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/05



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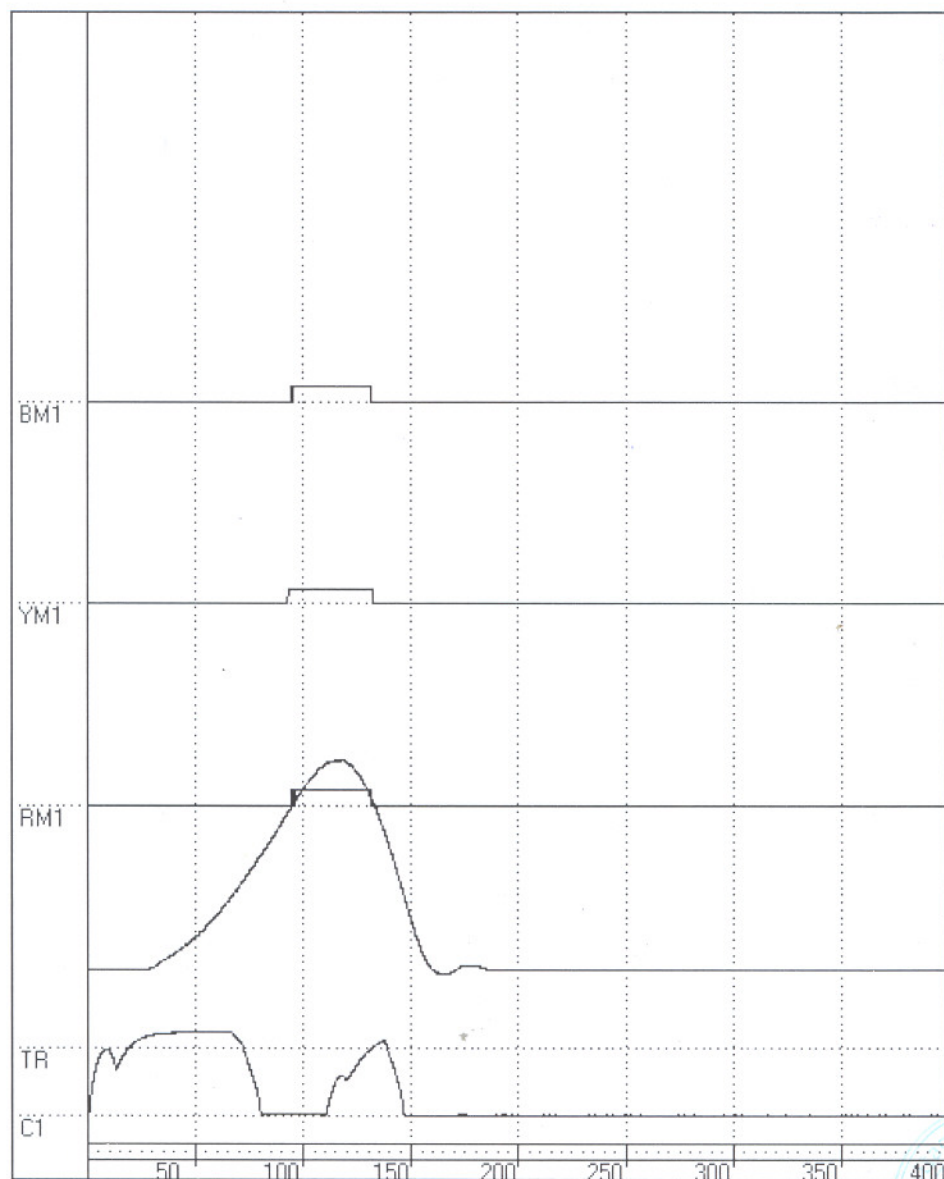
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/06



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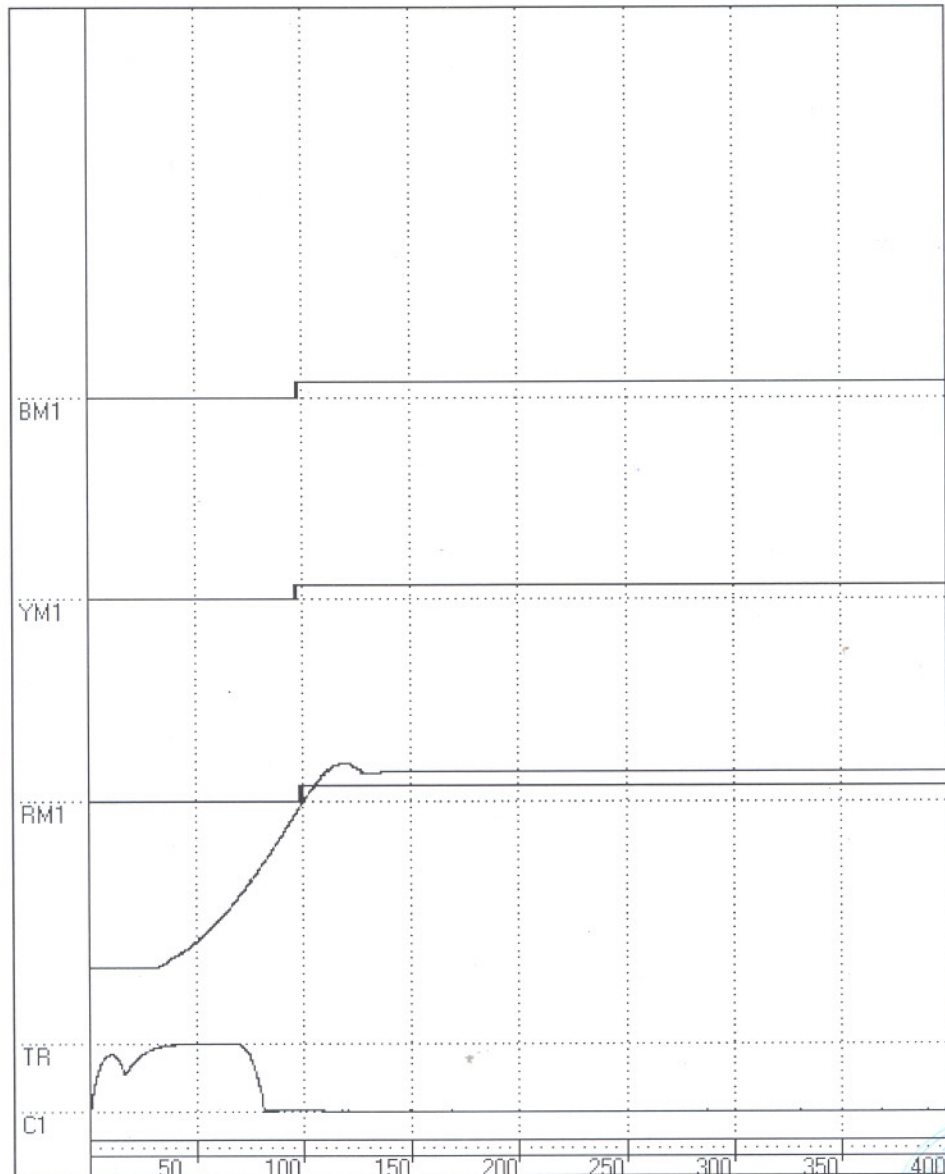
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/07



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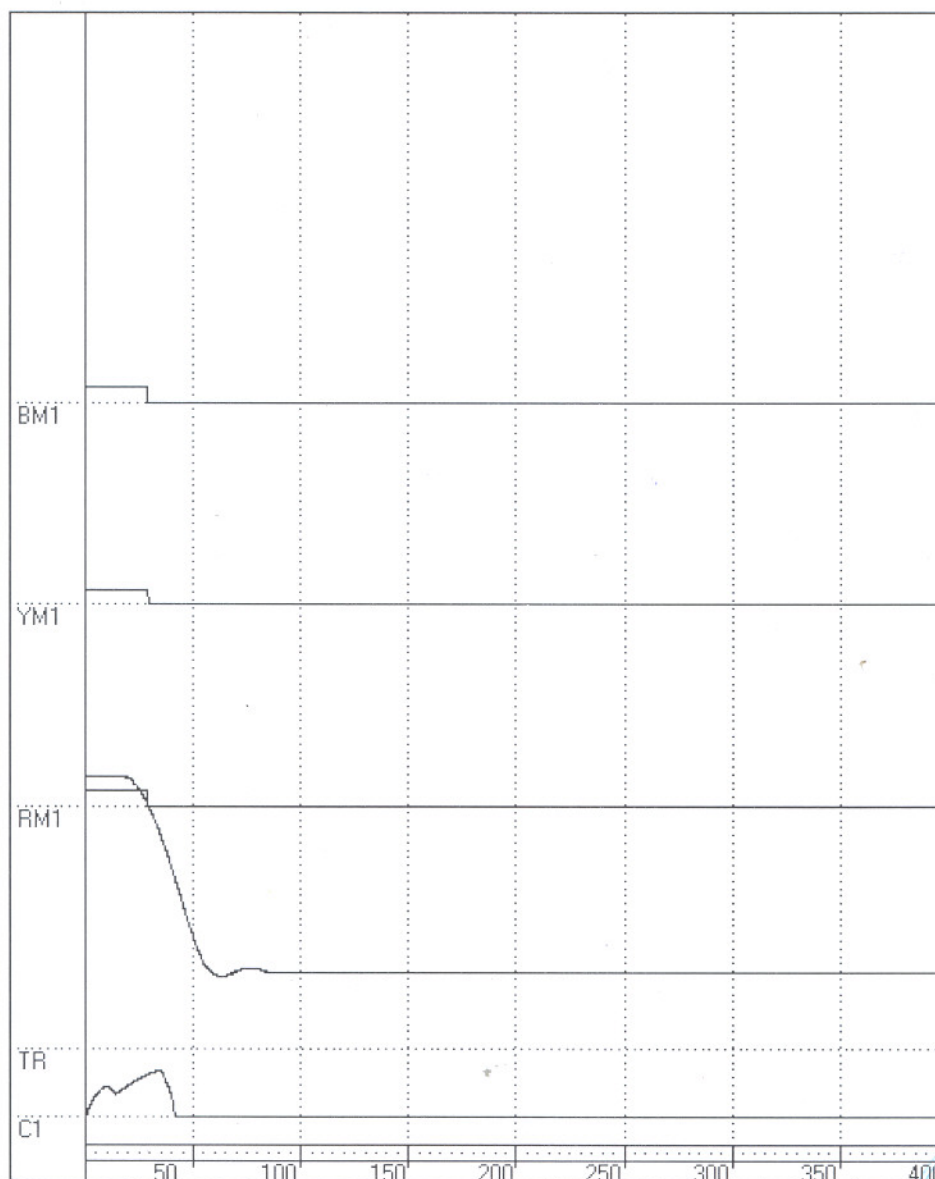
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/08



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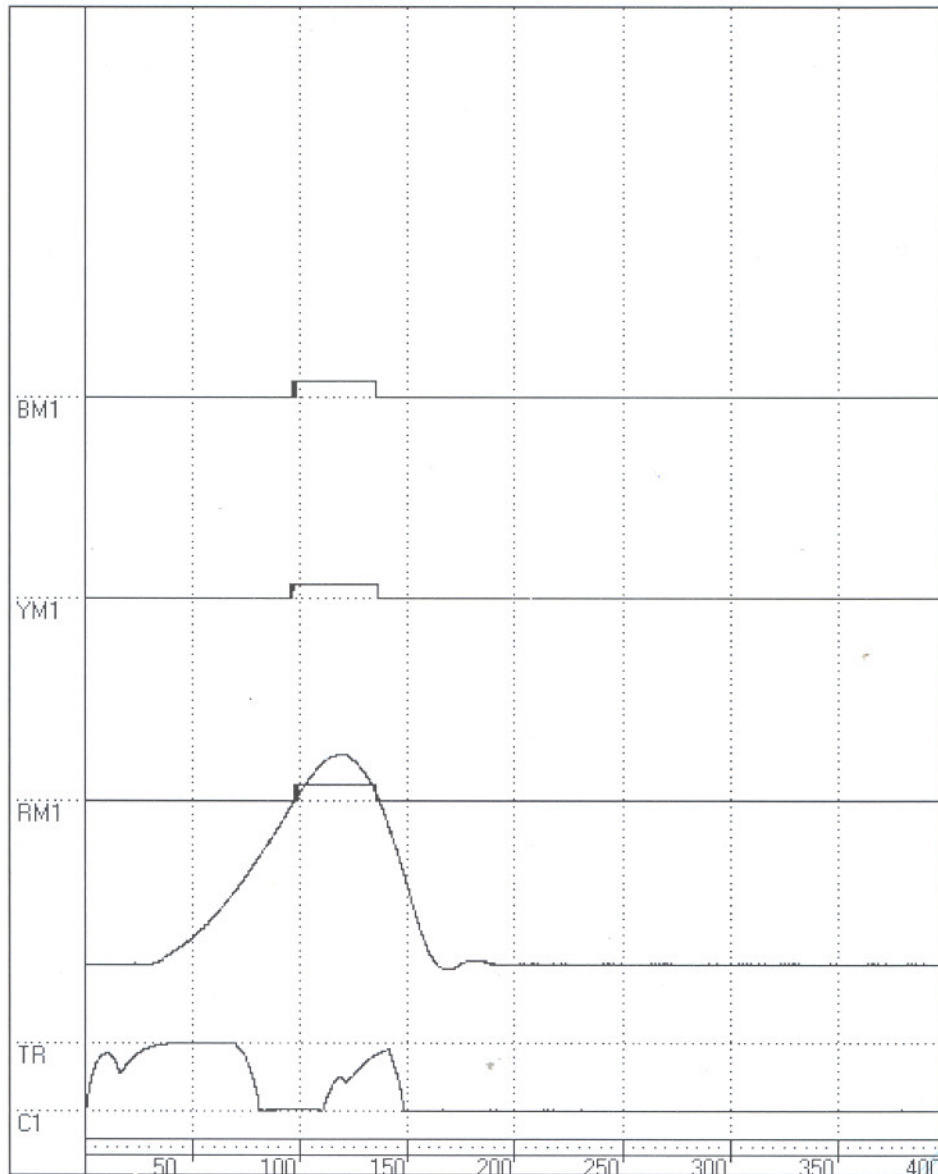
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/09



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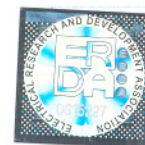
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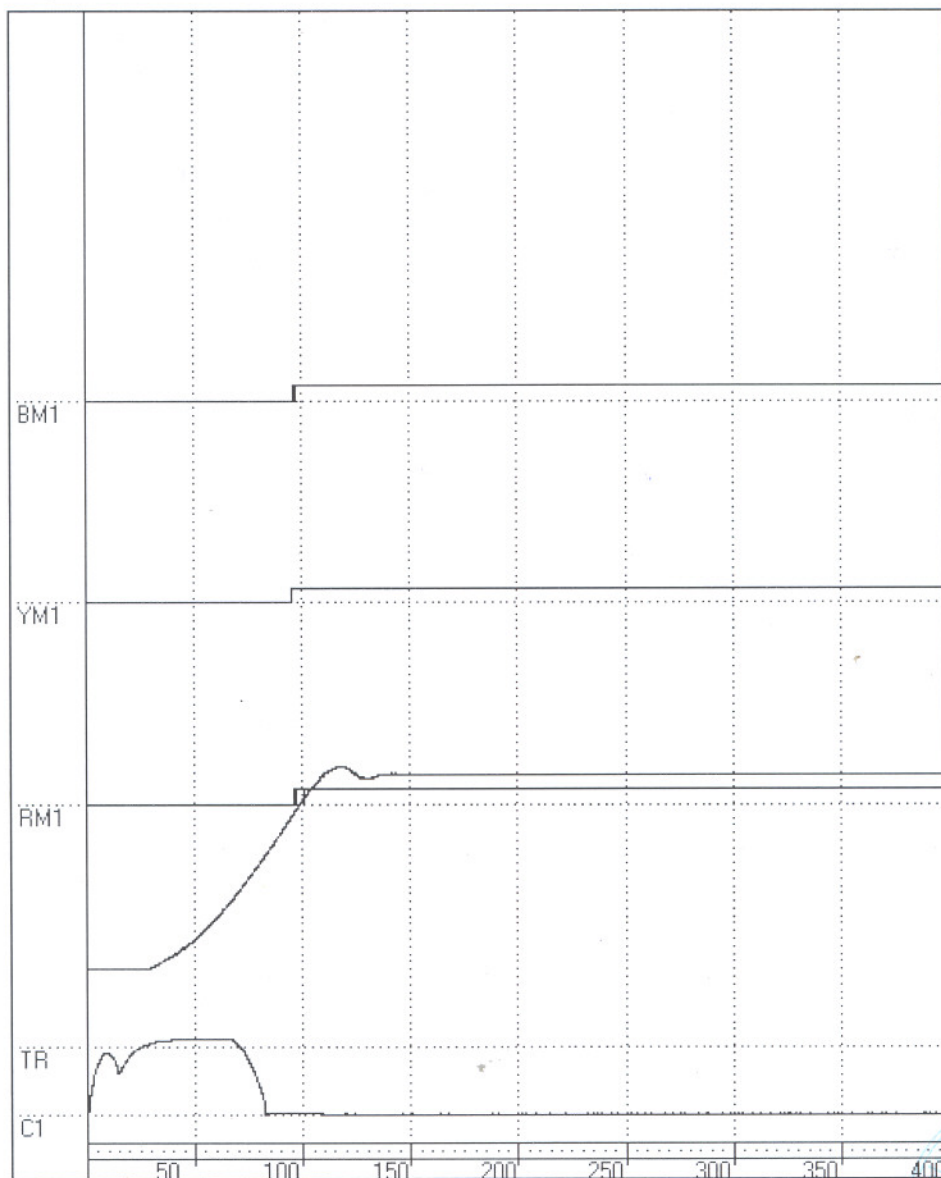
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/10



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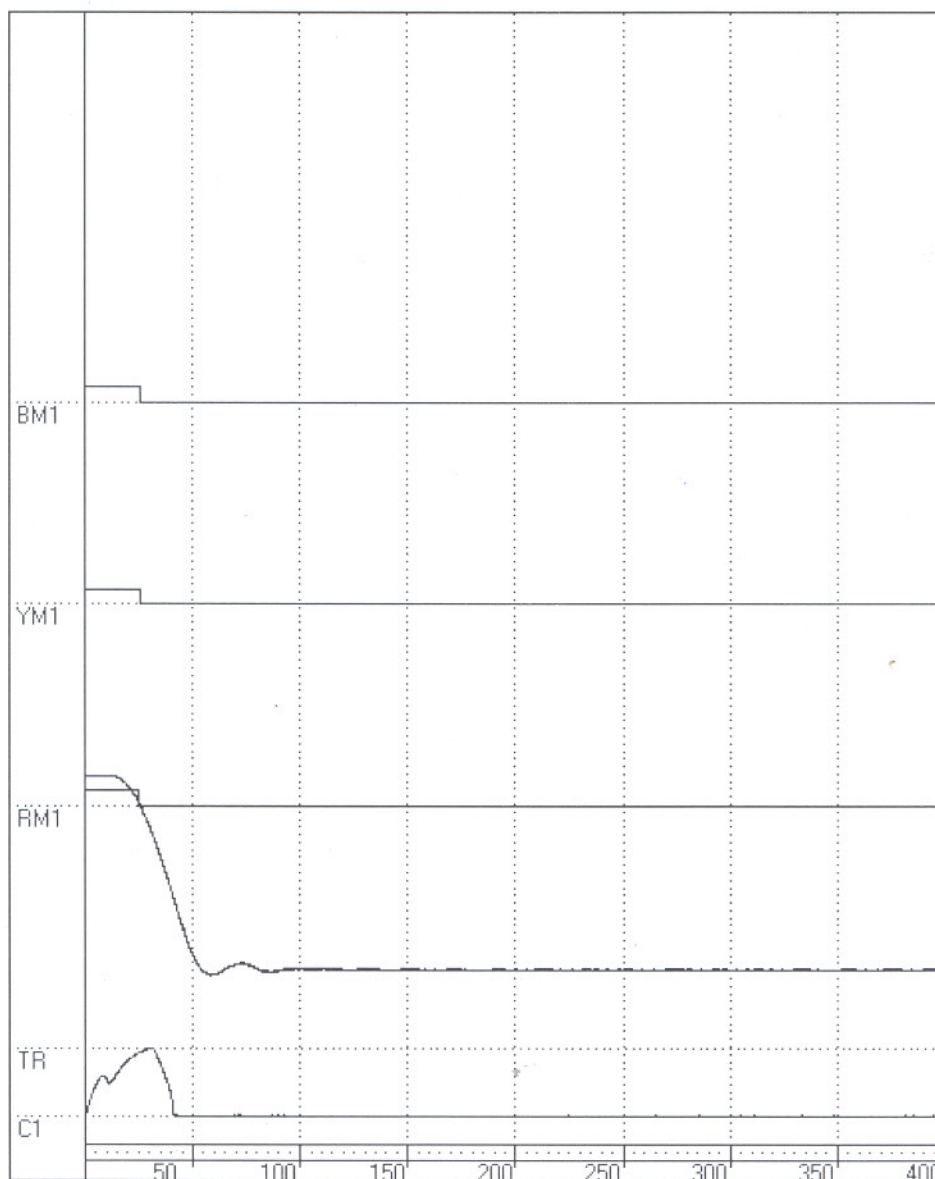
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/11



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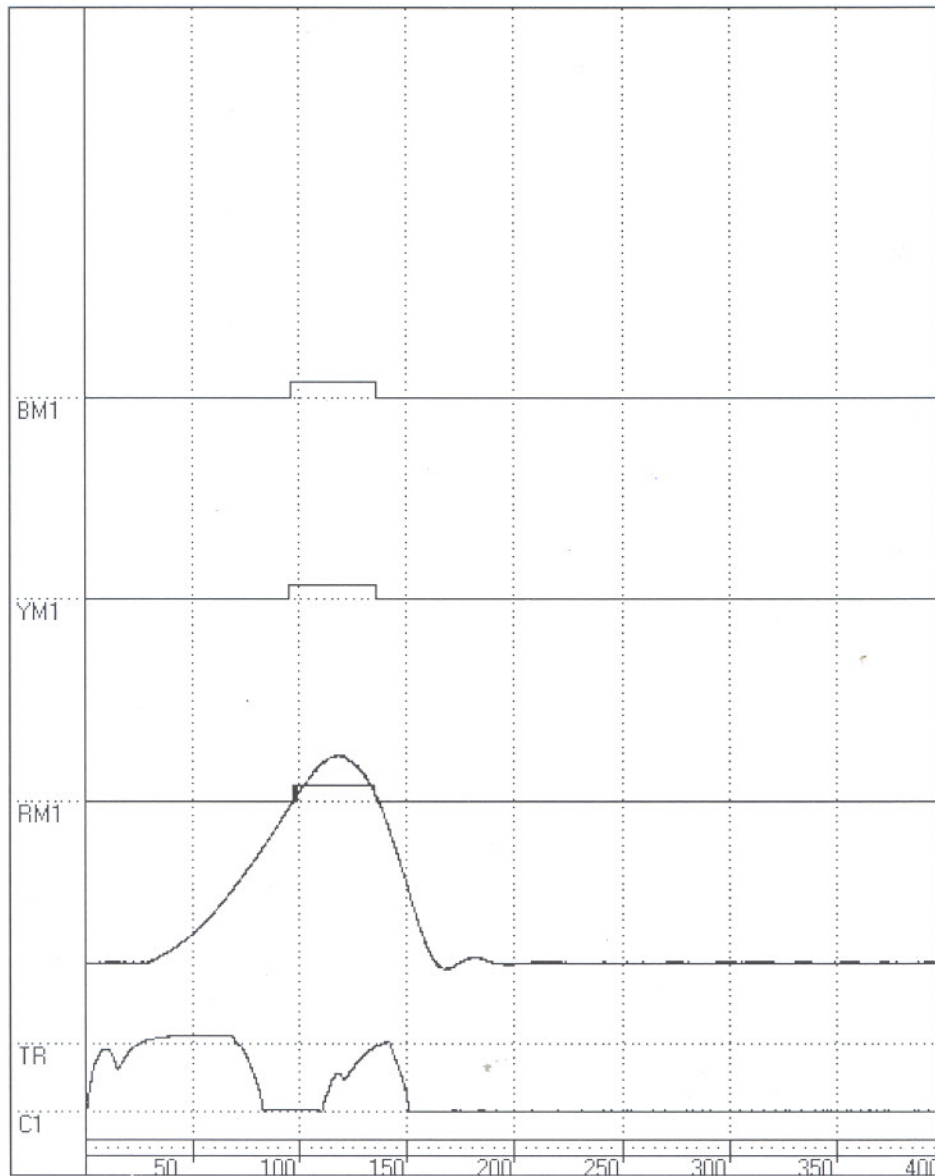
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/12



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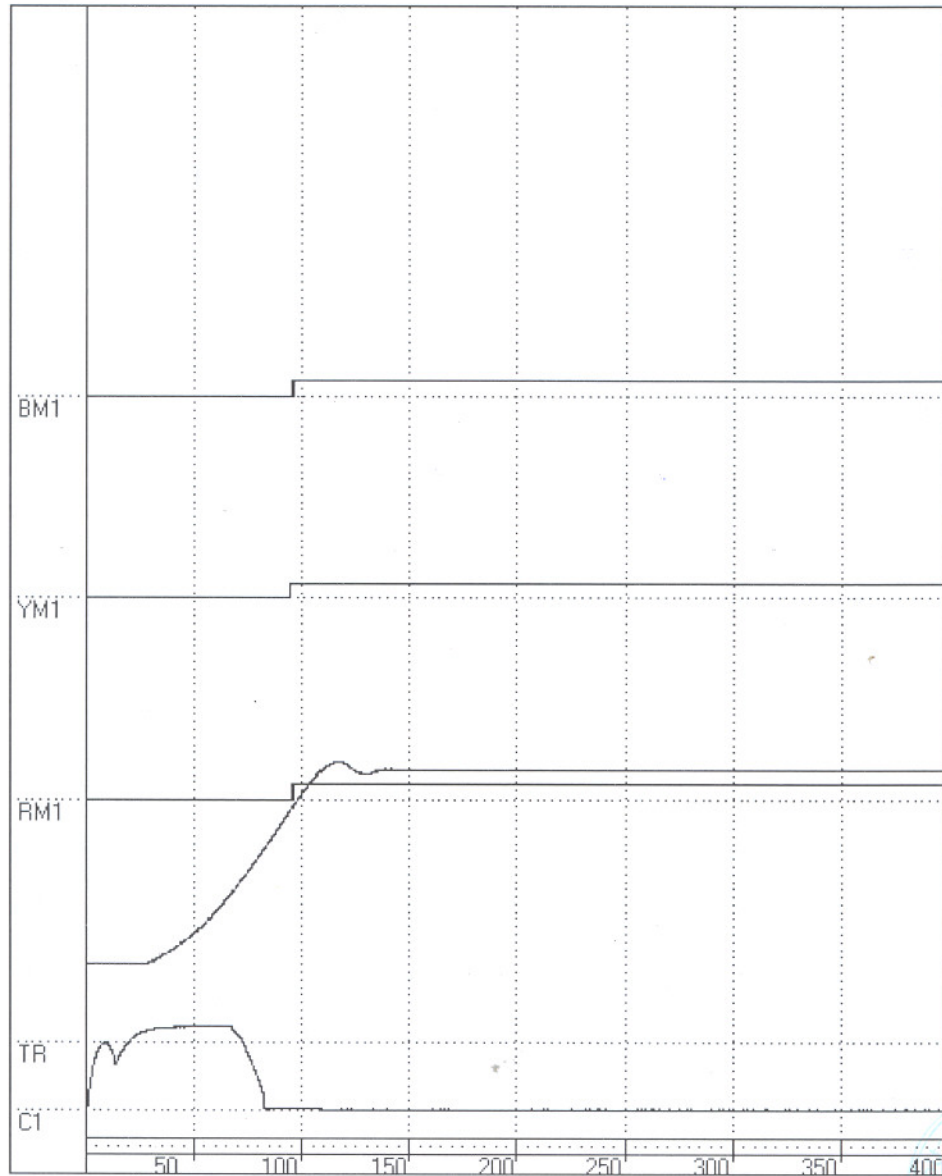
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/13



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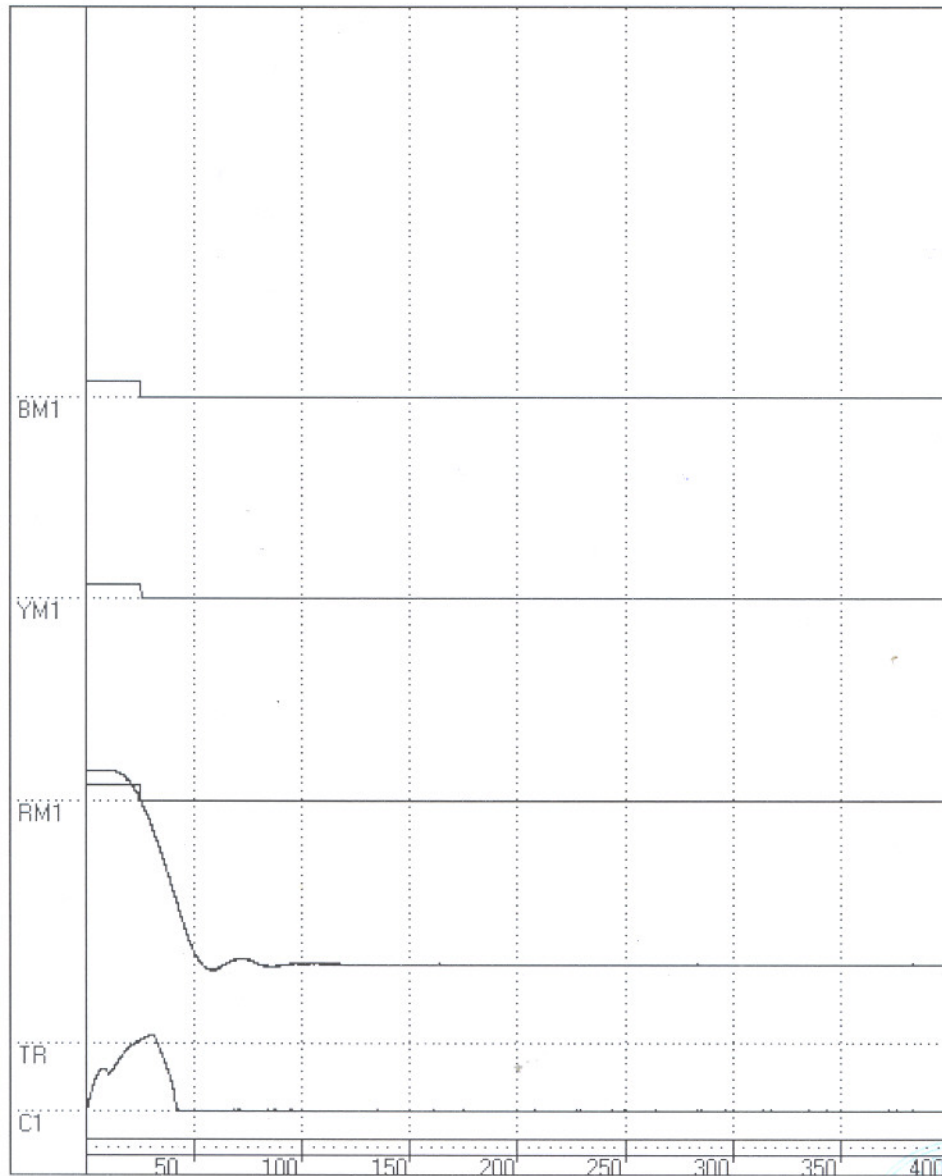
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/14



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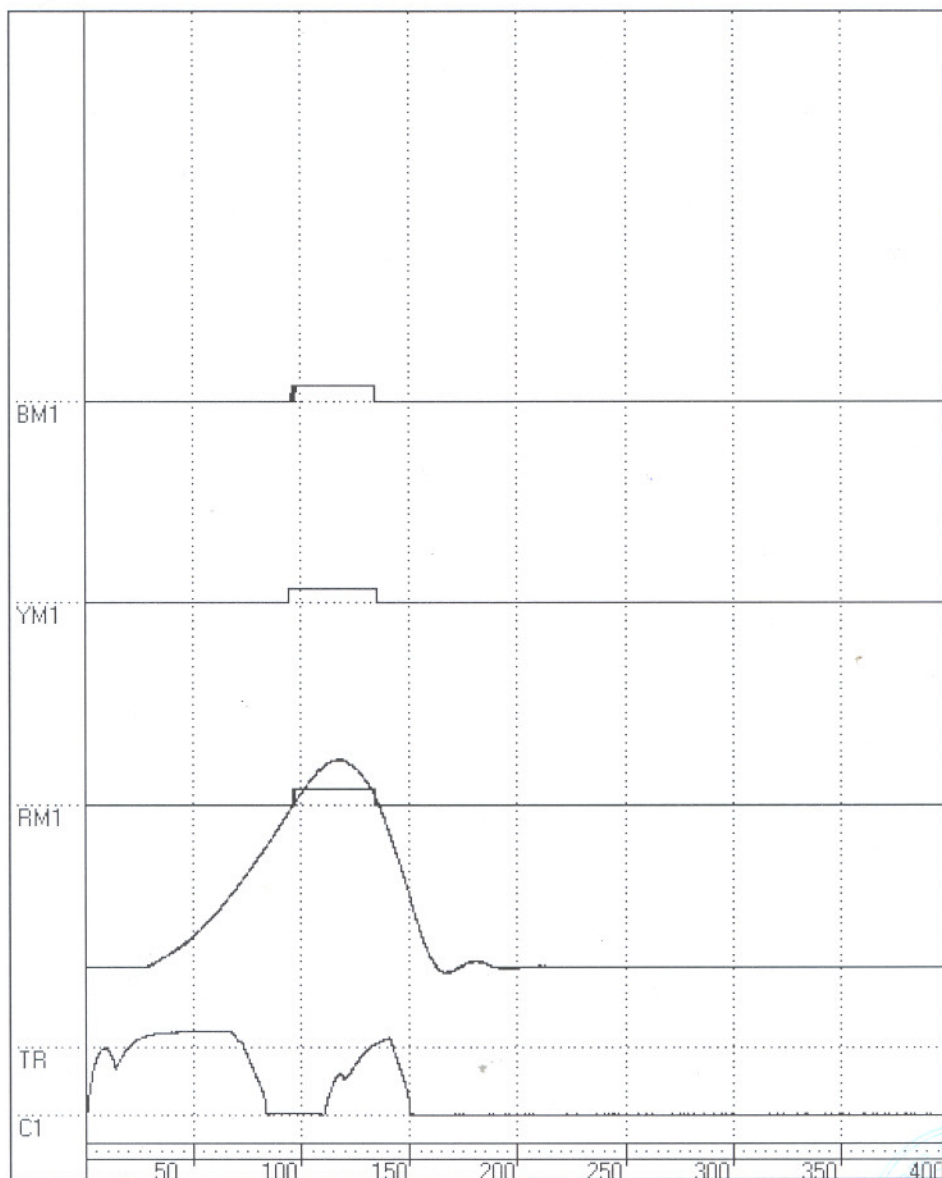
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/15



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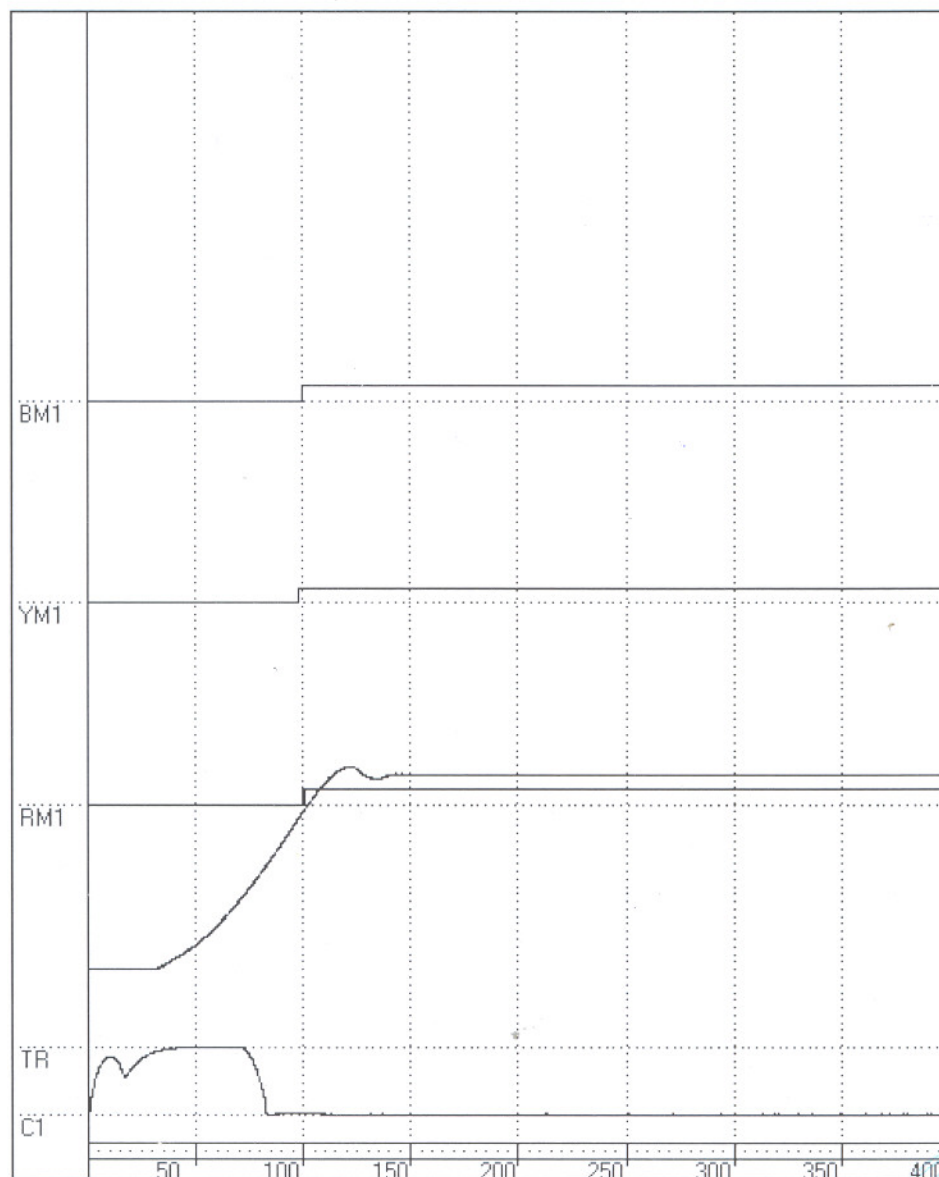
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/16



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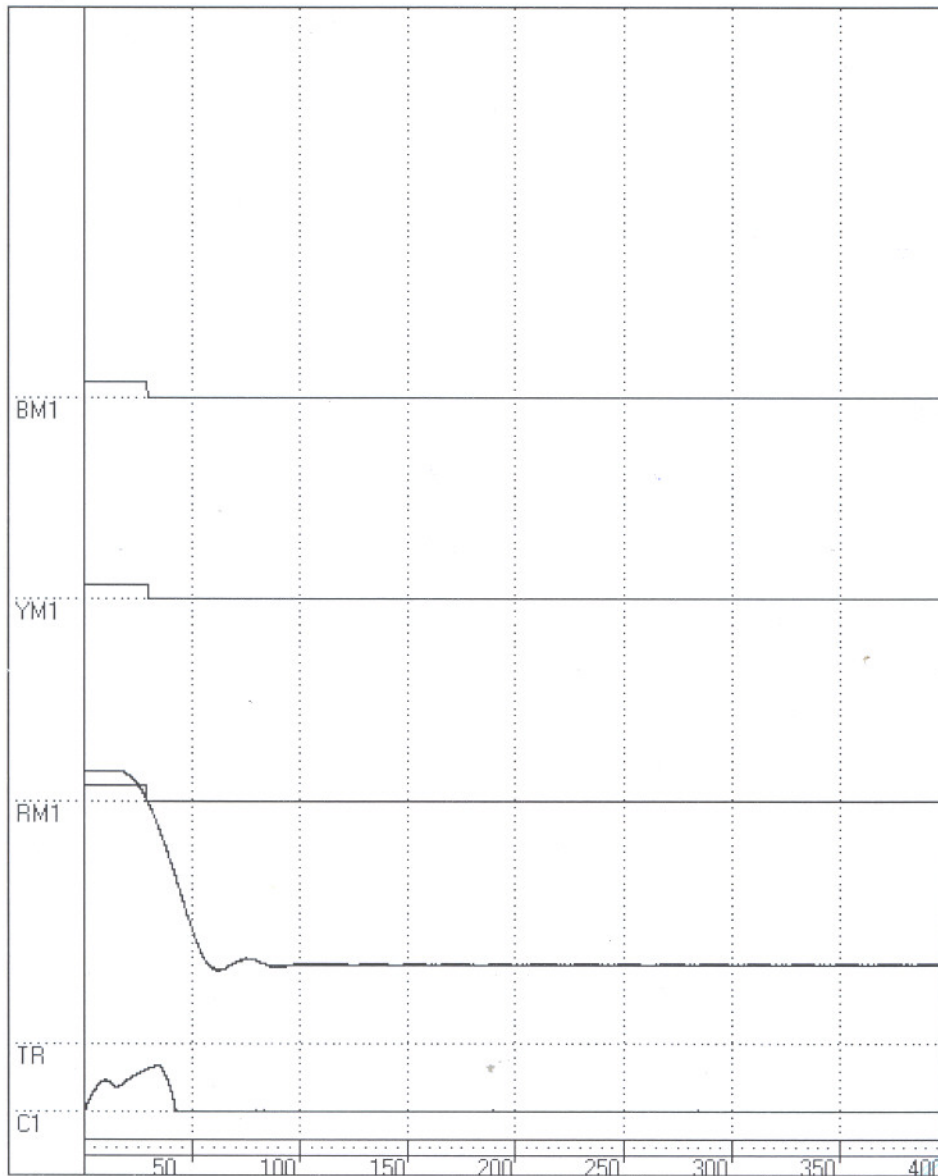
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Test Report No. : LSWG/2911

Date: 11/03/2011

Oscillogram No. 1186/01/17



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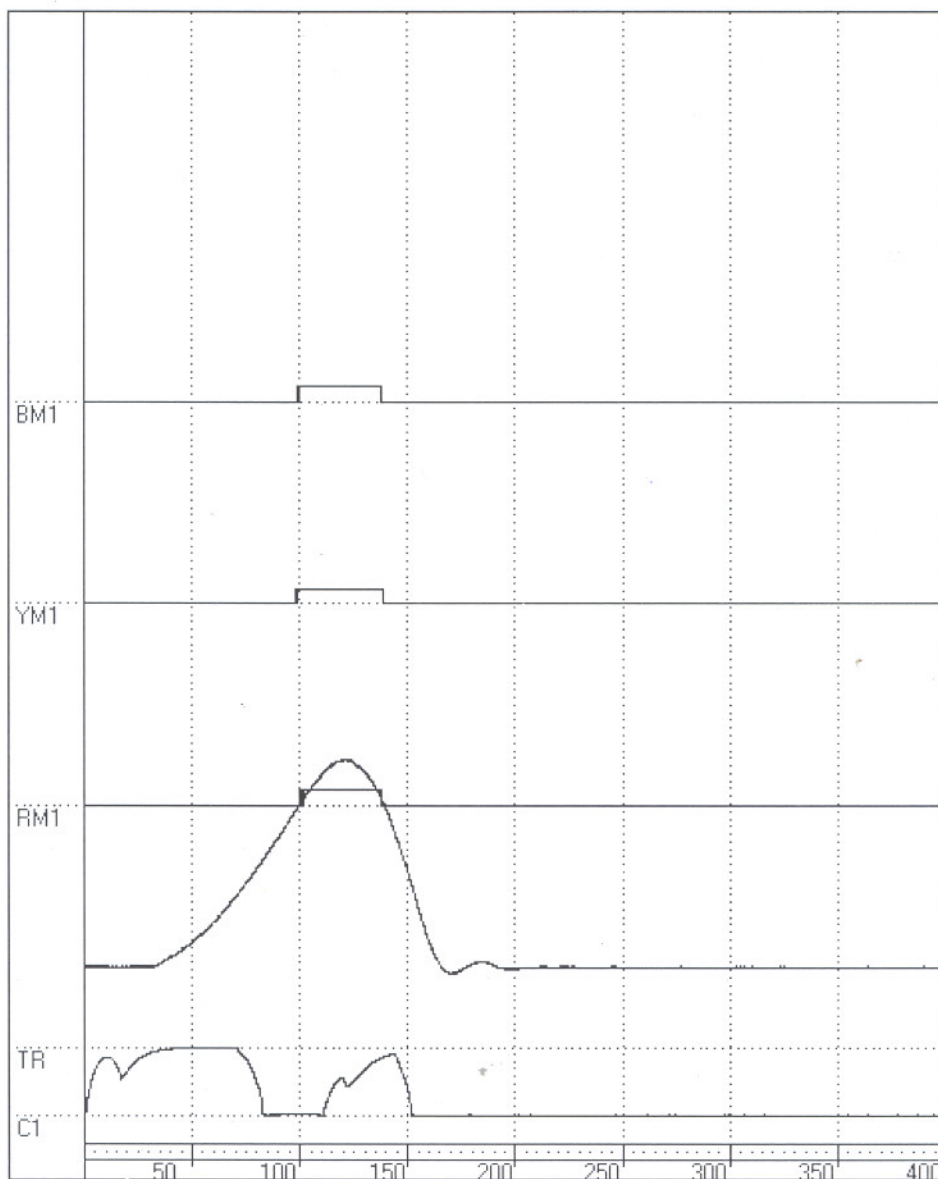
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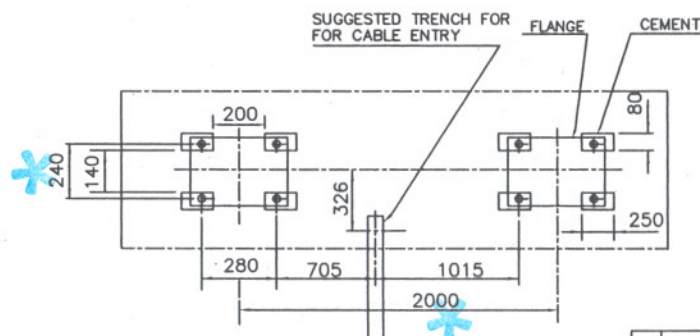
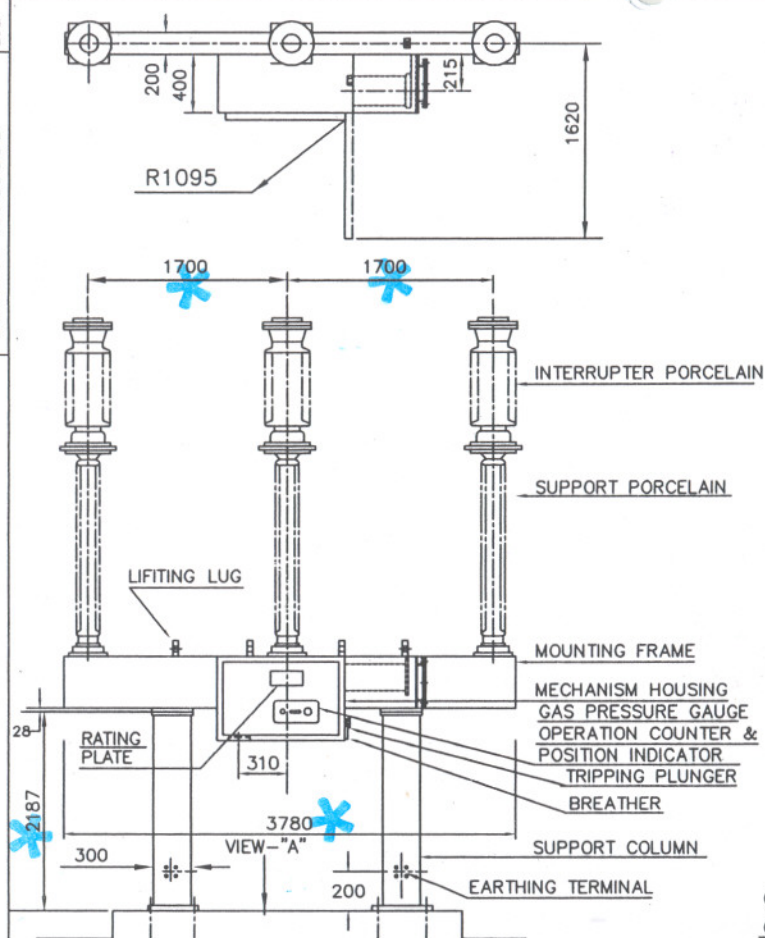
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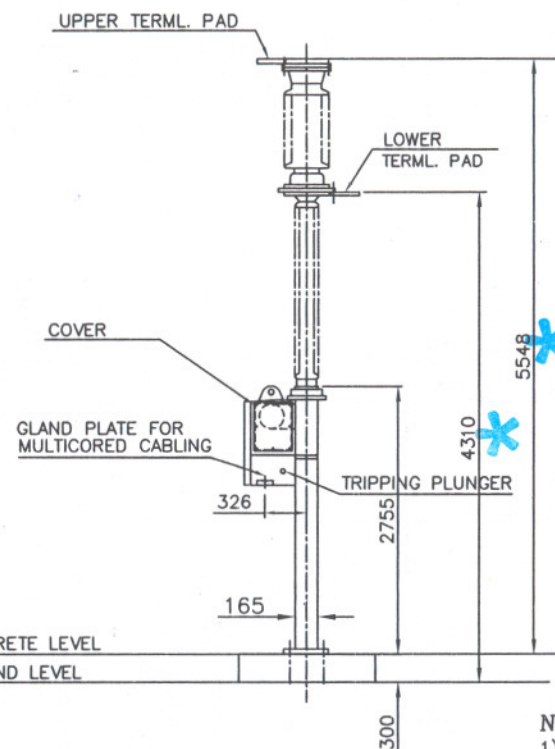
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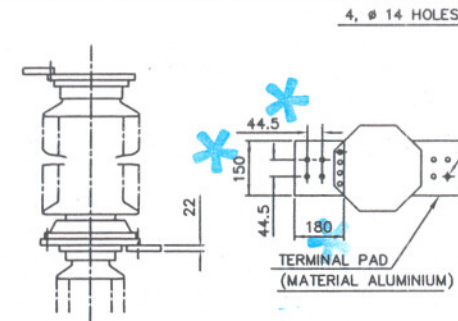


FOUNDATION DESIGN
DETAILS OF VIEW - "A"

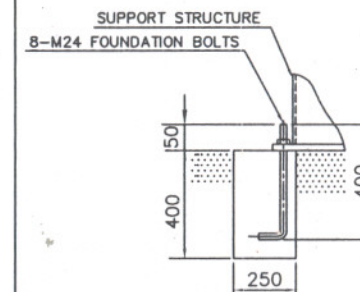
CONCRETE LEVEL
GROUND LEVEL



NOTE:- CLEAN BOTH CONNECTING SURFACES OF TERMINAL PADS AND TERMINAL FLANGE WITH SAND PAPER AND COAT SUPPLIED COMPOUND BEFORE CONNECTING.



DETAIL OF UPPER AND LOWER TERMINAL PADS



DETAIL OF FOUNDATION BOLT

NOTE :-

- 1) TOTAL WEIGHT INCLUSIVE OF COLUMN:-1550Kg.(APPROX.)
- 2) TOTAL GAS WEIGHT :-7.5 Kg. (APPROX.)
- 3) MAXIMUM SHOCK LOAD DURING OPERATION :-2000 Kg.
- 4) FINISH :- ALL EXPOSED FERROUS PARTS ARE PAINTED WITH SHADE 631 OF IS:5
- 5) CREEPAGE DISTANCE: 3625mm
- 6) HARDWARES EXPOSED TO ATMOSPHERE ARE H.D.G./S.S.

Test Report No. 100072911
Date: 11/3/11
Product: 145KV SP GCB
Verified by: A. P. D. S.
Verification of this drawing by ERDP is limited to relevant dimensional checks only.
Verified dimensions are marked with *

NO	REVISION	SIGN	DATE	SCALE	N.T.S.	DATE: 01/01/11	THIRD ANGLE PROJECTION GENERAL ARRANGEMENT FOR 145KV-40KA SP SP SINGLE STACK GCB	Crompton Greaves Ltd. SWITCHGEAR DIVISION S3 AMBAD, NASHIK.
2		DRN						
1		CHD						
		APPD						



USED ON: 145kV, 40kA

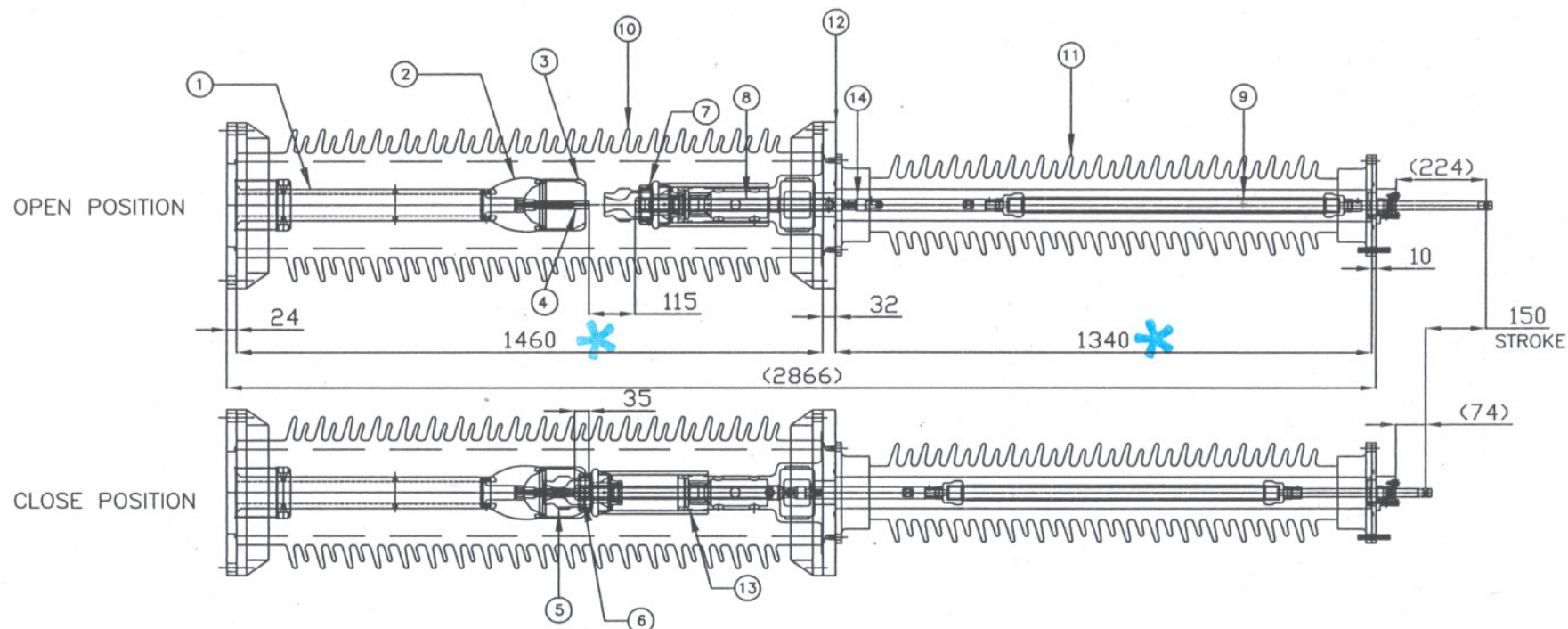
ASSLY.DRG.NO.:

CODE NO.:

REF.DRG.NO.:

Wt.:

SR NO.	DESCRIPTION	SR NO.	DESCRIPTION
1	UPPER TERMINAL	8	PISTON ROD
2	JOINT (CASTING)	9	INSULATING ROD ASSEMBLY
3	STATIONARY MAIN CONTACT	10	INTERRUPTER PORCELAIN
4	STATIONARY ARC CONTACT	11	SUPPORT PORCELAIN
5	NOZZLE	12	LOWER TERMINAL
6	MOVING ARC CONTACT ASSEMBLY	13	MULTILAM CONTACT LA-CUDS/90/0.15/LAG
7	MOVING MAIN CONTACT	14	SOCKET



Test Report No: 161067/29/11
 Date: 17/3/11
 Product: 145kV SF6 GCB
 Verified by: A. P. S. S. S.
 Verification of this drawing by ERDA is limited to relevant dimensional checks only
 Verified dimensions are marked with *

3			ALL DIMENSIONS IN mm			THIRD ANGLE PROJECTION	
			SIGN	NAME	DATE	POLE UNIT ASSEMBLY-145kV (TYPE: 120-SFM-32B)	
2			DRN.	M. P. S. S.	05.04.11		Crompton Greaves Ltd SWITCHGEAR DIVISION S3 AMBAD, NASHIK
			CHD.	M. P. S. S.	05.04.11		
1			APPD.	SSS	05.04.11		
			GENERAL TOLERANCES				
NO.	REVISION	DATE	SCALE		NTS	DRG.NO. 4949638	
						REV. 0	

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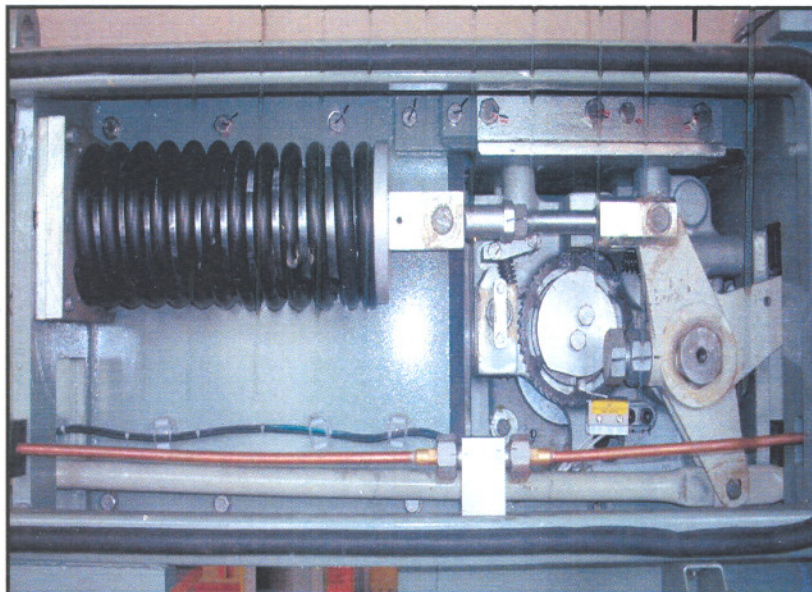
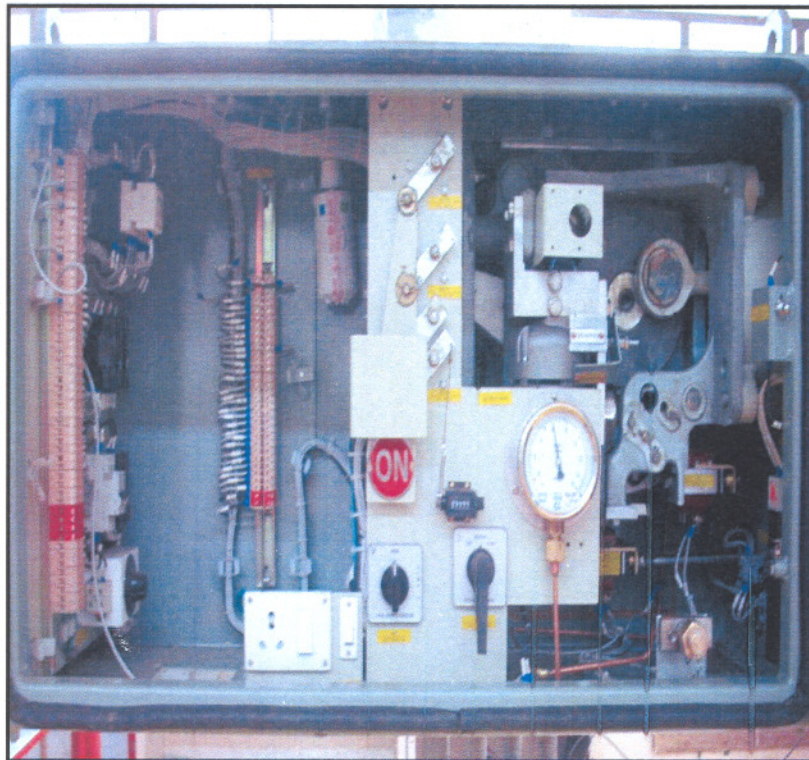
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Test Report No. : LSWG/2911

Date: 11/03/2011



Photograph no. : 1186/01/B

**MECHANISM OF
145kV SF6 GAS CIRCUIT BREAKER
(SPRING CLOSING - SPRING OPENING)**



0528137

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Test Report No. : LSWG/2911

Date: 11/03/2011



Photograph no. : 1186/01/A

**145kV SF6 GAS CIRCUIT BREAKER
(SPRING CLOSING – SPRING OPENING)**



0528136