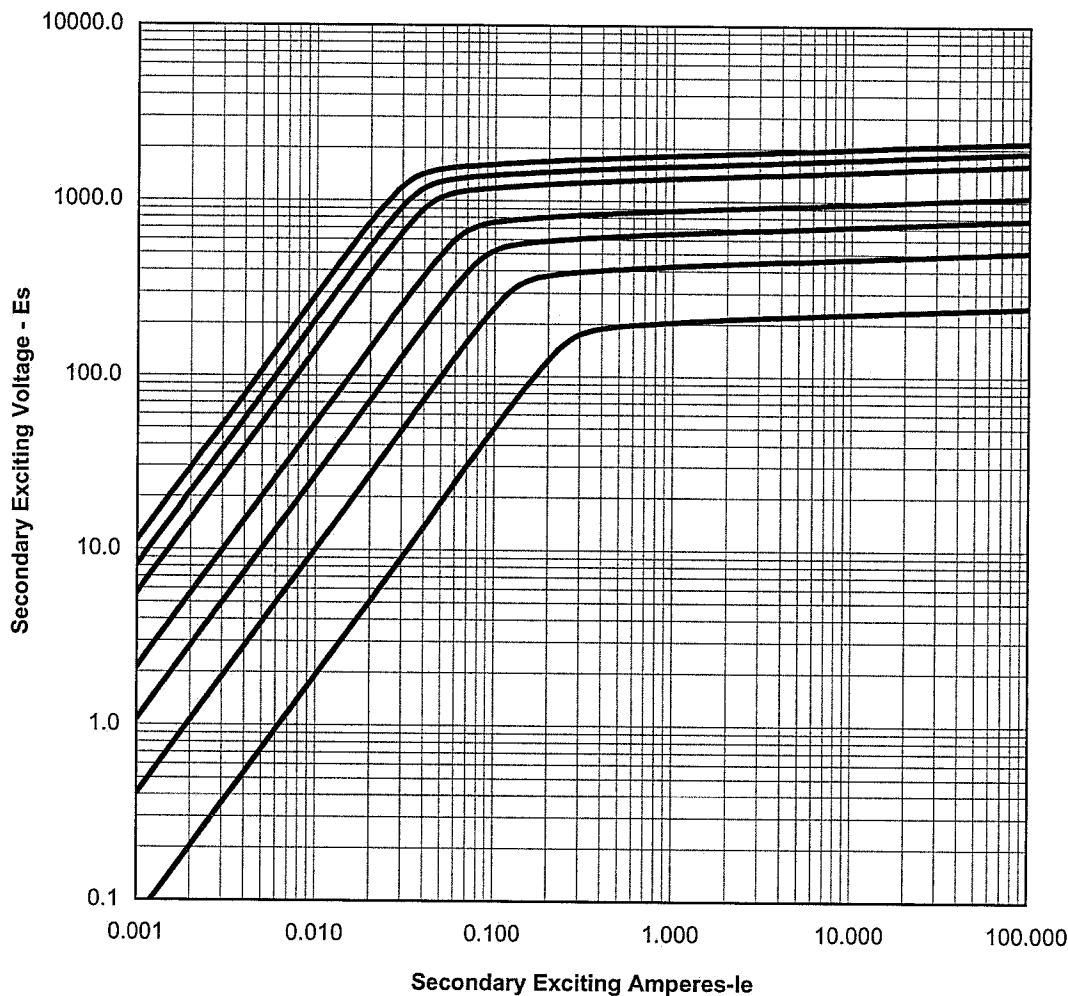


RATIO	TURNS	CONNECTION	TYPICAL EXCITATION CURRENT CURVES	
150 : 1	150	X1-X2	STANDARD:	IEC 60044-1
300 : 1	300	X1-X3	TYPE:	BUSHING
450 : 1	450	X2-X4	FREQUENCY:	50 HZ
600 : 1	600	X1-X4	MAXIMUM RATIO:	1200 : 1 MR
900 : 1	900	X3-X5	TOTAL SECONDARY TURNS:	1200
1050 : 1	1050	X2-X5	SECONDARY RESISTANCE:	0.00491 OHMS/TURN @ 75 DEG. C
1200 : 1	1200	X1-X5	ACCURACY CLASS:	5P30 50VA @ 1200:1
			BURDEN:	50.00 VA
			CONTINUOUS THERMAL	
			RATING FACTOR:	2.0 TIMES RATED @ ALL TAPS
			THERMAL RATING:	130.0 KA RMS SYM./3 SEC. @ FULL RATIO
			DYNAMIC RATING:	260.1 KA RMS SYM./3 SEC. @ FULL RATIO



ORDER OF CURVES
1200 : 1
1050 : 1
900 : 1
600 : 1
450 : 1
300 : 1
150 : 1



AREVA
CHARLEROI, PA 15022

1-417-131-P11090

drawn: *[Signature]* 12/12/2007

checked: *[Signature]* 12/12/2007

sheet:

DIMENSIONS: O.D. = 25.5" HT. = 2.875" WT. = 123 LBS.

RATIO CORRECTION FACTOR CURVES		
RATIO	TURNS	CONNECTION
150 : 1	150	X1-X2
300 : 1	300	X1-X3
450 : 1	450	X2-X4
600 : 1	600	X1-X4
900 : 1	900	X3-X5
1050 : 1	1050	X2-X5
1200 : 1	1200	X1-X5

STANDARD:

IEC 60044-1

TYPE:

BUSHING

FREQUENCY:

50 HZ

MAXIMUM RATIO:

1200 : 1 MR

TOTAL SECONDARY TURNS:

1200

SECONDARY RESISTANCE:

0.00491 OHMS/TURN @ 75 DEG. C

ACCURACY CLASS:

5P30 50VA @ 1200:1

BURDEN:

50.00 VA

CONTINUOUS THERMAL

RATING FACTOR:

2.0 TIMES RATED @ ALL TAPS

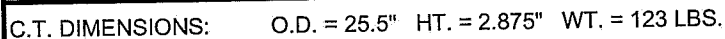
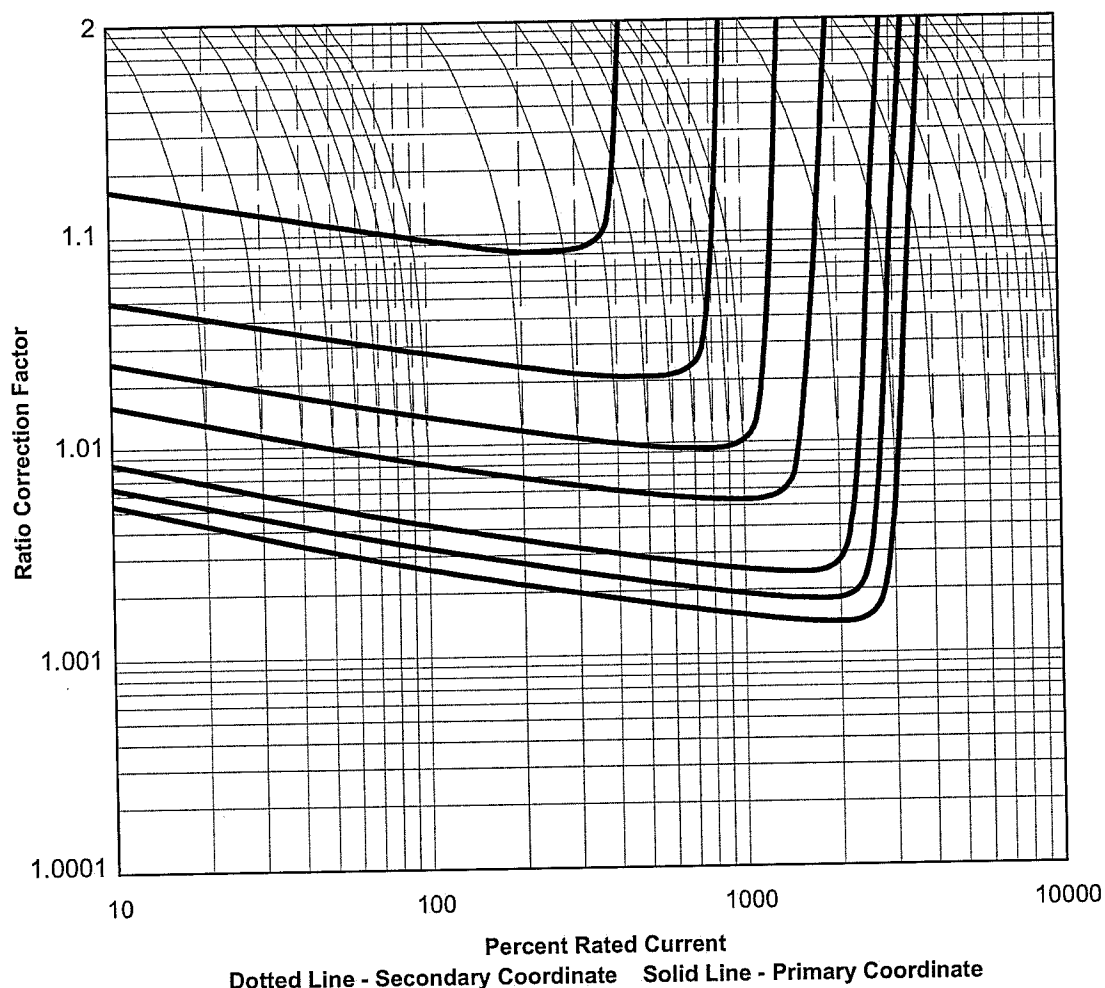
THERMAL RATING:

130.0 KA RMS SYM./3 SEC. @ FULL RATIO

DYNAMIC RATING:

260.1 KA RMS SYM./3 SEC. @ FULL RATIO

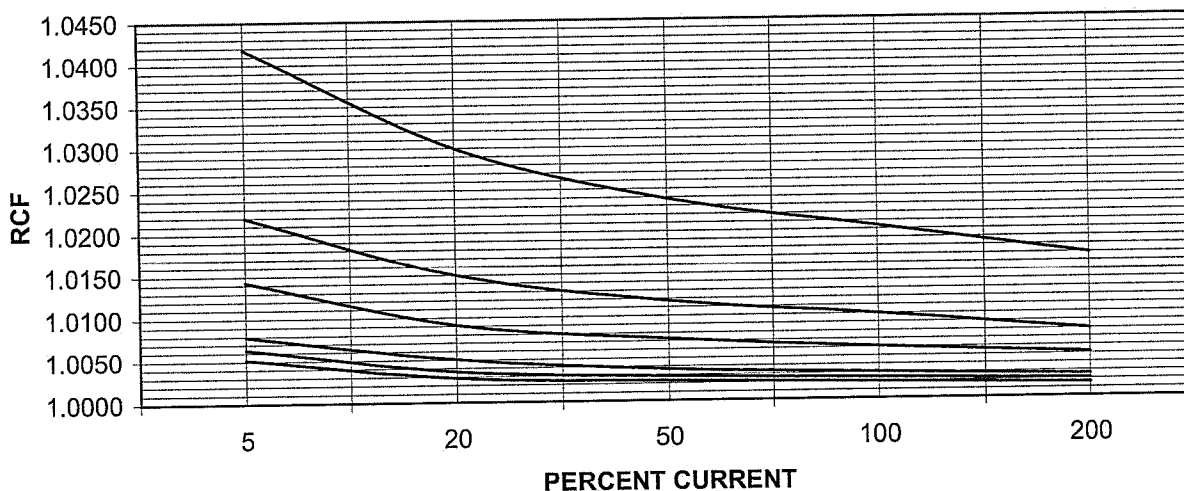
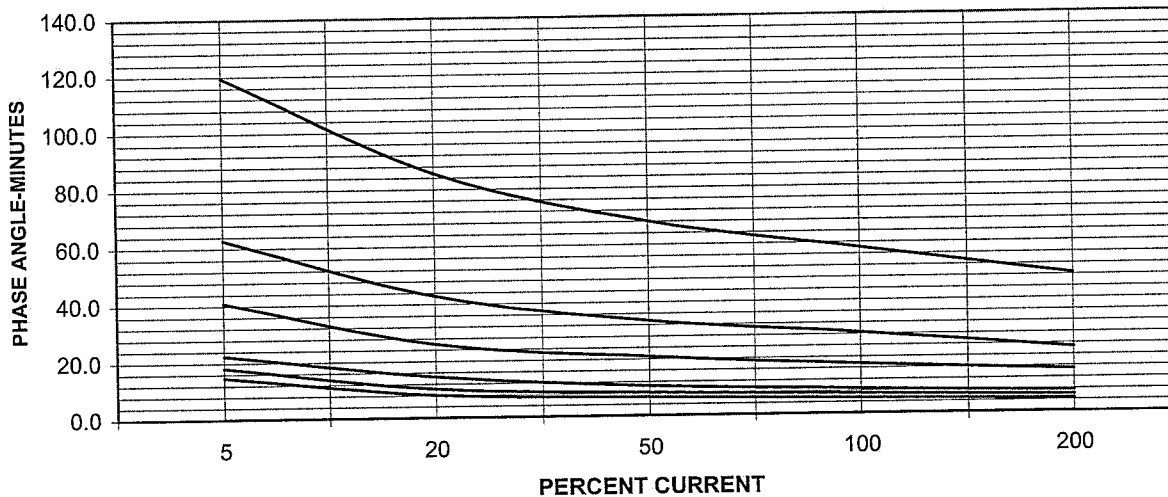
RATIO CORRECTION FACTOR CURVES



RATIO CORRECTION FACTOR AND PHASE ANGLE CURVES

STANDARD: IEC 60044-1
 TYPE: BUSHING
 FREQUENCY: 50
 MAXIMUM RATIO: 1200 : 1 MR
 ACCURACY CLASS: 0.2 30VA FS42 @ 1200:1
 TOTAL SEC. TURNS: 1200
 SECONDARY RESISTANCE: 0.00447 OHMS PER TURN @ 75 DEG. C
 BURDEN: 30.0 VA
 CONTINUOUS THERMAL RATING FACTOR: 2.0 TIMES RATED @ ALL TAPS
 THERMAL RATING: 130.0 KA RMS SYM. FOR 3 SEC. AT FULL RATIO
 DYNAMIC RATING: 260.1 KA RMS SYM. FOR 3 SEC. AT FULL RATIO

CONNECTION	TURNS	RATIO
X1-X2	150	150 : 1
X1-X3	300	300 : 1
X2-X4	450	450 : 1
X1-X4	600	600 : 1
X3-X5	900	900 : 1
X2-X5	1050	1050 : 1
X1-X5	1200	1200 : 1



AREVA
 CHARLEROI, PA 15022

J.T. DIMENSIONS: O.D. = 25.5" HT. = 2.375" WT. = 97 LBS.

1-417-131-P11091

drawn: *[Signature]* 12/12/2007
 checked: *[Signature]* 12/12/2007
 sheet:



ROUTINE TEST REPORT
HIGH VOLTAGE CIRCUIT BREAKER
TYPE: HGF1014
SERIAL NUMBER: 13310-HG14 Rev. 0
TEST NUMBER: D9918, TEST DATE: 8/28/2008
CUSTOMER: Soyuz Contract Kft. / FSK

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Tested by (inspector): JK Date: 8/28/2008

Review and release: Sig.   Date: 8/28/2008

T&D

1. GENERAL INFORMATION

Manufacturer:	AREVA T&D Inc.
Circuit breaker type:	HGF1014
AREVA test plan:	Q-10-111 Rev. 1
According to standard:	IEC (62271-100)
Operating mechanism type:	FKF 2-9
Circuit breaker serial no:	13310-HG14 Rev. 0
Contract no:	CX04451
Test no:	D9918
Outline drawing number:	HG14C0414 Rev. 2
Wiring diagram number:	HG14C0414 Rev. 2
Instruction manual number:	HG12-IM-R
Customer:	Soyuz Contract Kft. / FSK
Plant/Substation:	Bureyskaya
Purchase order no.:	Contract #4 ANNEX 6
Equipment / Item no.:	N/A

2. RATED VALUES OF CIRCUIT BREAKER

Rated voltage:	252 kV
Maximum service voltage:	252 kV
Rated frequency:	40 Hz
Rated continuous current:	2000 A
Rated short circuit breaking current:	40 kA
Rated pressure:	6.8
Nominal stroke:	200 mm

2.1 CONTROL VOLTAGES AND FUNCTIONAL LIMITS

Closing coil(s):	220 DC V
Tripping coil(s):	220 DC V
Control apparatus:	220 DC V
Spring winding motor:	220 AC V
Cabinet heater:	220 AC V
Tank heaters:	220 AC V

2.2 FUNCTIONAL LIMITS OF CLOSING AND AUXILIARY FUNCTIONS

	Min.		Max.
Closing and auxiliary functions:	187 DC V	242 DC V	
Tripping functions:	154 DC V	242 DC V	
Motor voltage:	187 AC V	242 AC V	

3. CURRENT TRANSFORMER TESTS

Polarity after assembly: Pass
Wiring check: Pass
CT ratios: Pass

4. NAMEPLATE CHECK

Check for completeness of identification and rating: Pass

5. LEAKAGE TEST

Test pressure 6.8 bar: Pass (no leaks detected)

6. HEATER AND COIL VALUES

1. Closing coil: 140.2 Ω
2. Closing coil: N/A Ω

1. Trip coil: 140.2 Ω
2. Trip coil: 140.3 Ω

1. Cabinet heater: 640 Ω
2. Cabinet heater: 609 Ω
3. Cabinet heater: 613 Ω
4. Cabinet heater: 612 Ω

1. Auxiliary cabinet heater N/A Ω
2. Auxiliary cabinet heater N/A Ω

Tank heaters A (Phases 1/2/3): 52.1/50.8/51.8 Ω
Tank heaters B (Phases 1/2/3): 50.7/53.1/50.4 Ω

7. ELECTRICAL CONTROLS AND SECONDARY WIRING CHECK TEST

Continuity test: Pass
Functional test: Pass

8. CLEARANCE AND MECHANICAL ADJUSTMENT CHECK TESTS

Mechanical adjustments: Pass

9. CONDUCTIVITY OF CURRENT PATH TEST

Phase	A	B	C
Resistance at 100 A min.	128 $\mu\Omega$	128 $\mu\Omega$	126 $\mu\Omega$

10. TIMING TESTS

CLOSING			
Parameter / Phase	A	B	C
Closing time	127.0 ms	127.8 ms	127.7 ms
Difference between phases	0.8 ms		

OPENING			
Parameter / Phase	A	B	C
Opening time	22.0 ms	21.7 ms	21.9 ms
Difference between phases	0.3 ms		

CLOSE-OPEN			
Parameter / Phase	A	B	C
Trip-free time	71.1 ms	70.2 ms	70.6 ms

OPEN-CLOSE			
Parameter / Phase	A	B	C
Reclose time	145.7 ms	147.7 ms	146.9 ms

11. MOTOR CHARACTERISTICS (STORED ENERGY SYSTEM TEST)

Motor running time at rated voltage: 9 sec
Motor current at rated voltage: Start: 4.7 A End: 8.2 A

12. MECHANICAL OPERATION TESTS

Operation	Control voltage	Number of operations	Results
Close - Minimum Voltage	187 DC V	5	Pass
Close - Rated Voltage	220 DC V	5	Pass
Close - Maximum Voltage	242 DC V	5	Pass
Open - Minimum Voltage	154 DC V	5	Pass
Open - Rated Voltage	220 DC V	5	Pass
Open - Maximum Voltage	242 DC V	5	Pass
Close-Open - Rated Voltage	220 DC V	5	Pass
Open-Close - Rated Voltage	220 DC V	5	Pass

13. LOW-FREQUENCY WITHSTAND VOLTAGE TESTS ON MAJOR INSULATION COMPONENTS

Test frequency: 60 Hz
Test pressure: 5.5 bar
Duration: 60 sec

Test conditions		Results		
Condition	Applied voltage (kV)	Phase 1	Phase 2	Phase 3
Across open contacts	460	Pass	Pass	Pass
Line to ground	460	Pass	Pass	Pass

14. LOW-FREQUENCY WITHSTAND VOLTAGE TESTS ON CONTROL AND SECONDARY WIRING

Location	Test frequency	Duration	Applied voltage	Results
Wiring / coils / control apparatus	60 Hz	1 sec	2 kV	Pass
Spring winding motor	60 Hz	1 sec	2 kV	Pass
Current transformers and wiring	60 Hz	60 sec	3 kV	Pass

15. GAS DENSITY MONITORING SYSTEM

Alarm level 5.8 bar
Lockout 5.5 bar
Lockout #2 5.5 bar
Test temperature: 20 (deg C)

16. ADDITIONAL MEASUREMENTS AND VALUES

Maintenance dimensions ¹⁾	Xao	Xbo	Xco
	50 mm	50.3 mm	51.3 mm

No. of operations performed during factory test: 115

17. ADDENDUM

Enclosed documents:

- Travel-time curves
- Additional Measurements

Serial Number Listing:

Operating mechanism: 2861
Current transformers 1X/Y/Z: 21052306 / 21052203 / -
Current transformers 2X/Y/Z: 21052204 / 21052202 / -
Current transformers 3X/Y/Z: 21052303 / 21052201 / -
Current transformers 4X/Y/Z: 21052207 / 21052205 / -
Current transformers 5X/Y/Z: 21052302 / 21052206 / -
Current transformers 6X/Y/Z: 21052209 / 21052208 / -
Insulators 1/2/3/4/5/6: 2008-SC-11 / 2008-SC-10 / 2008-SB-07 / 2008-SB-28 / 2008-SC-04 / 2008-SC-16
Phase vessels 1/2/3 (ht/serial no): 487-730 / 812-773 / 763-760

