R48-1073-1

Test Report

APPARATUS	**ACB(Air Circuit-Breaker)**
TYPE	AS-16D3-16A
RATINGS	3 Poles, 50/60 Hz, 690 V, 500 V, 1 600 A, 500 V-70 kA, 690 V-65 kA/1 s
STANDARD	IEC 60068-2-1: 2007 and the testing specification of client
TEST PERFORMED	Cold Test
DATE OF TESTS	July 04, 2008 – July 07, 2008
CLIENT	LS Industrial Systems Co., Ltd.
MANUFACTURER	LS Industrial Systems Co., Ltd.

Test result

The tests have been carried out in accordance with the instructions of the applicant.

The test results are presented in the record of tests with the performance of the apparatus tested and the observations made during the tests.

The test results apply only to the specific samples tested.

Number of pages : total(8), cover(1), records(6), Photograph(1)

LS Industrial Systems

Prepared	**Choi, Chong-Hwan** Test Engineer
Checked	**Kim, Myoung-Seok**
Approved	**Han, Gyu-Hwan** Technical Manager
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PT&T

LS Industrial Systems, Power Testing & Technology Institute
1, Songjeong-dong, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, Korea, 361-720
Tel: +82-(0)43-261-6571, Fax: +82-(0)43-261-6628, E-mail: hpl@lsis.biz

Client

Jung, Bang-Hun LS Industrial Systems Co., Ltd.

Witnessed by

Jung, Bang-Hun LS Industrial Systems Co., Ltd.

Contents

Apparatus designation	Page 3
Summary of test	Page 4
Test results	Page 5 ~ 7
Photograph	Page 8

The measurement uncertainty of the test results in this document is maximum 5 % for voltage, current and time. Which is estimated at the level of twice the standard deviation (corresponding to a confidence level of 95 % for the coverage factor of 1.96 in the case of normal distribution).

Representation of test result in the records of test:

Passed = Satisfied with criteria
Failed = Unsatisfied with criteria
N.A. = Not applicable

Apparatus Designation

Subject	ACB(Air circuit-breaker)
Manufacturer	LS Industrial Systems Co., Ltd.
Type designation	AS-16D3-16A
Frame size	2000AF (D Frame)
Number of poles	3
Rated frequency	50/60 Hz
Rated operational voltage	690 V, 500 V
Rated insulation voltage	AC 1000 V
Rated impulse withstand voltage	12 kV
Suitability for isolation	Yes
Rated current	630 A, 800 A, 1 000 A, 1 250 A, 1 600 A
Rated ultimate short-circuit breaking capacity	70 kA-500 V, 65 kA-690 V,
Rated service short-circuit breaking capacity	Ics=100 % Icu
Rated short-time withstand current	65 kA / 1 s
Utilization category	B
Type of tripping device	Electronics Trip Device
Short time releases:	-
Current setting (or range of settings)	Isd=1.5 2-3-4-5-6-8-10-OFF × Ir (adjustable-8 settings)
Time setting (or range of setting)	I²t off: 0.05-0.1-0.2-0.3-0.4 (adjustable-5 settings) I²t on: 0.1-0.2-0.3-0.4 (adjustable-4 settings)
Instantaneous releases:	
Current setting (or range of settings)	2-3-4-6-8-10-12-15 In (adjustable-8 settings)
Time setting (or range of setting)	Fixed (< 50 ms)
Inverse time-delay release:	
Current setting (or range of settings)	0.4~1.0 In (adjustable-P TYPE: 60 settings)
Time setting (or range of setting)	0.5-1-2-4-8-12-16-20 (adjustable-8 settings)
Release dependent on ambient air temperature	No
Reference temperature	-
Dimension of specimen	334 mm (W) x 430 mm (H) x 375 mm (D)
Dimension of metal screen	434mm(W) x 430mm(H) x 375 mm(D)
Construction break	No
Contact material	AgNiGr4/AgNi15 (Fixed) , AgWC(Moving)
Earthing system	Phase-earthed system / IT system
Relative humidity	45 ~ 85 % R.H.
IP code	IP30
Pollution degree	3
Suitable for environment	A
Field conditions	Inhomogeneous(Case A)
Accessory	Shunt release / Under voltage release Charging motor / Auxiliary switch
Tripping current for a single pole	10×In max (According to Annex H)
Operating time for 200 % of In	Inverse time delay -max. (20 s) : 152 ~ 317 s.

Summary of test

No.	Test item	Quantity	Test results		Test date	Page
			Passed	Failed		
1	Cold test	2	2	0	2008.07.04~ 2008.07.07	5 ~ 7

Analysis of test result

The apparatus (ACB) was satisfactorily operated before and after the cold test.

Cold test

Apparatus	ACB(Air Circuit-Breaker)	Quantity	2 EA
Type	AS-16D3-16A	Rating	3 Poles, 50/60 Hz, 690 V, 70 kA, 65 kA/1 s
Standard	IEC 60068-2-1: 2007, Testing specification of client	Ambient temperature & humidity in Lab.	+17 °C, 16 %R.H.
Test date	2008.07.04 ~ 07.07	Tested by	Choi, chong-hwan

1. Test method and/or condition
   1) The apparatus shall be exposed to the low temperature conditions for the duration and achieved temperature stability.
   2) Duration: 2 hours
   3) After the cold test, final measurement as below;

Test items	Description
Normal operational test	The normal switching sequence three times without current condition under the rated control supply voltage
Overload release test	Over-current relays shall trip with the value of the published current value corresponding to the current setting.

2. Test equipment/instrument
   1) Temperature & humidity chamber. HITACHI, ES-206LH, 70-0242
   2) Over current tester. LSIS, 86-0087

3. Criterion
   1) Normal operational test: test specimen shall close/open satisfactorily at the rated control supply voltage.
   2) Overload release test:

Tripping curve	Setting values	Tripping time (s)
Long-time delay	1.3*In (tr20)	7 200
Instantaneous time delay	3*In	≤0.04

4. Test results
   1) 1st test at ambient temperature

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	17.2	16.9
	Instantaneous time delay(ms)	24	26
LCD Display		satisfactorily operate	satisfactorily operate

Verdict	Passed

Cold test

Apparatus	ACB(Air Circuit-Breaker)	Quantity	2 EA
Type	AS-16D3-16A	Rating	3 Poles, 50/60 Hz, 690 V, 70 kA, 65 kA/1 s
Standard	IEC 60068-2-1: 2007, Testing specification of client	Ambient temperature & humidity in Lab.	+17 °C, 16 %R.H.
Test date	2008.07.04 ~ 07.07	Tested by	Choi, chong-hwan

2) 2nd test at -10 °C(2 h)

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	17.7	18.9
	Instantaneous time delay(ms)	26	26
LCD Display		satisfactorily operate	satisfactorily operate

3) 3rd test -20 °C(2 h)

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	17.8	18.5
	Instantaneous time delay(ms)	28	22
LCD Display		satisfactorily operate	satisfactorily operate

4) 4th test -30 °C(2 h)

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	17.6	18.5
	Instantaneous time delay(ms)	20	19
LCD Display		satisfactorily operate	satisfactorily operate

Verdict	Passed

Cold test

Apparatus	ACB(Air Circuit-Breaker)	Quantity	2 EA
Type	AS-16D3-16A	Rating	3 Poles, 50/60 Hz, 690 V, 70 kA, 65 kA/1 s
Standard	IEC 60068-2-1: 2007, Testing specification of client	Ambient temperature & humidity in Lab.	+17 °C, 16 %R.H.
Test date	2008.07.04 ~ 07.07	Tested by	Choi, chong-hwan

5) 5th test -40 °C(2 h)

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	17.6	18.4
	Instantaneous time delay(ms)	20	22
LCD Display		satisfactorily operate	satisfactorily operate

6) 6th test -40 °C(Breaker Open 2 h)

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	15.7	18.5
	Instantaneous time delay(ms)	25	24
LCD Display		satisfactorily operate	satisfactorily operate

7) 7th test(the end of test at 25 °C)

Verification of test items		Results	
		#1	#2
Normal operational test (85 %)		satisfactorily operate	satisfactorily operate
Overload release test	Long-time delay(s)	17.2	16.9
	Instantaneous time delay(ms)	24	25
LCD Display		satisfactorily operate	satisfactorily operate

Verdict	Passed

Photograph