

**R48-0192****Test Report**

<b>APPARATUS</b>	<b><u>MCCB(Molded Case Circuit-Breaker)</u></b>
<b>TYPE</b>	TS800N ETS43
<b>RATINGS</b>	3 Poles, 50/60 Hz, 690 V, 65 kA - 415 V
<b>STANDARD</b>	IEC 60068-2-1: 2007, Testing specification of client
<b>TEST PERFORMED</b>	Cold test (at -40 °C)
<b>DATE OF TESTS</b>	January 30, 2008 – January 31, 2008
<b>CLIENT</b>	LS Industrial Systems Co., Ltd.
<b>MANUFACTURER</b>	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.

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**Number of pages :** total(11), cover(1), records(7), photographs(3)



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**Client**

Kim, Young-Jun

LS Industrial Systems Co., Ltd.  
Quality assurance Team**Witnessed by****Contents**

Apparatus designation	Page 3
Table of test	Page 4
Test results	Page 5 ~ 8
Photographs	Page 9 ~ 11

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**

Test specimen	MCCB (Molded-case circuit-breaker)
Manufacturer	LS Industrial Systems Co., Ltd.
Type	TS800N ETS43
Frame size	800 AF
Number of poles	3
Rated frequency	50/60 Hz
Rated operational voltage	AC 690 V
Rated insulation voltage	AC 750 V
Rated impulse withstand voltage	8 kV
Suitability for isolation	Yes
Rated current (In)	800 A
Current setting	0.4–0.5–0.6–0.7–0.8–0.9–1.0*In (7 adjustable steps)
Rated ultimate short-circuit breaking capacity	65 kA – 415 V
Rated service short-circuit breaking capacity	Ics=100% Icu
Utilization category	A
Type of tripping device	Electronics Trip Device
Short time releases:	
Current setting (or range of settings)	1.5–2–3–4–5–6–7–8–10*In (9 adjustable steps)
Time setting (or range of setting)	50–100–200–300 ms (4 adjustable steps)
Instantaneous releases:	
Current setting (or range of settings)	11 * In(fixed)
Inverse time-delay release:	
Current setting (or range of settings) (Ir)	0.4 ~ 1.0*In (13 adjustable steps)
Time setting (or range of setting)	
Release dependent on ambient air temperature	No
Reference temperature	40 °C
Shunt Trip(SHT);	
Rated operational voltage	AC 220 ~ 240 V/DC 250 V
Motor operator;(MOP);	MOP4
Rated supply voltage	AC 230 V/DC 220 V
Dimension of specimen	210(W) x 320(H) x 135(D)
Dimension of metal screen	260(W) x 520(H) x 135(D)

No.	Test items	Quantity	Test results		Test date	Page
			Passed	Failed		
1	Cold test	1	1	0	2008.01.30 ~ 2008.01.31	5 ~ 8
Analysis of test result						
<p>1. The apparatus was satisfactorily operated during the cold test at -40 °C.</p> <p>2. Remark: The MOP was satisfactorily operated during the intermediately measurement by power supply variation.</p>						



**Cold test**

Apparatus	MCCB (Molded Case Circuit-Breaker)	Quantity	1 EA
Type	TS800N ETS43	Rating	3 Poles, 50/60 Hz, 690 V, 800 A, 65 kA - 415 V
Standard	IEC 60068-2-1: 2007, Testing specification of client	Ambient temperature & humidity in Lab.	+ 10 °C, 15 %R.H.
Test date	2008.01.30 ~ 01.31	Tested by	Kim, Myoung-Seok

## 1. Test method and/or condition

## 1) Initial measurements

Normal operational test and overload release test at ambient temperature as below table 1.

## 2) The apparatus shall be exposed to the low temperature (-40 °C) conditions and achieved temperature stability.

## 3) Intermediate measurements

Normal operational test carried out at the inner test chamber and test method as below table 1.

## 4) Final measurements

Visual inspection and overload release test shall be immediately carried out at outer test chamber as below table 1.

Table 1.

Test items	Description
Normal operational test	a. manual operating; On/off position by the manual operation means. b. auxiliary switch(AX, AL) operating; AX: On/off operated by switch handle AL: induce the electrical signal by trip test-button or electrical tripping. c. SHT, MOP operating; The normal switching sequence shall be performed three times, - at 85 %, 100 %, and 110 % of the rated control supply voltage with SHT(shunt) - at 85 %, 100 %, and 110 % of the rated control supply voltage with MOP(motor operator)
Overload release test	Over-current relays shall trip with the test current of the published current value corresponding to the current setting as bellows; - Long time delay: $1.3 \cdot I_n$ - Short-time delay: $3 \cdot I_n$ (setting values; $I_r = 1.0 \cdot I_n$ , $I_{sd} = 3.0 \cdot I_r$ , $t_{sd} = 0.1$ s)

5) The apparatus is exposed to these conditions for the specified duration: at least 2 hours

6) The switching handle position of apparatus: Off position

## 2. Test equipment/instrument

1) Temperature & humidity chamber. HITACHI, EC-85MHHP, 70-0270

2) Programmable power source. CROMA, 56-0149

3) MCCB Instant tester. SAMHAN FA, 82-0435

## 3. Criterion

1) Normal operational test: manual operating, auxiliary switch, shunt and motor operating test shall be satisfactorily operated by the relevant specification.

Verdict	Passed
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## 2) Overload release test:

Tripping curves	Setting values	Test current (A)	Tripping time (s)
Long-time delay	1.3*In	1 040 A ± 10 %	221 s ± 20 %
Short-time delay	3.0*In	2 400 A ± 10 %	0.1 s ± 20 %

## 4. Test results

## 1) Initial measurement

Sample number	Verification of test items				Results
#1	Normal operational test				satisfactorily operate
	Auxiliary switch operating			AX	satisfactorily operate
				AL	satisfactorily operate
	Shunt release test (SHT)	AC	85 %	154 Va.c.	satisfactorily operate
			100 %	220 Va.c.	satisfactorily operate
			110 %	264 Va.c.	satisfactorily operate
		DC	85 %	175 Vd.c.	satisfactorily operate
			100 %	250 Vd.c.	satisfactorily operate
			110 %	275 Vd.c.	satisfactorily operate
	Motor operator (MOP)	AC	85 %	196 Va.c.	satisfactorily operate
			100 %	230 Va.c.	satisfactorily operate
			110 %	253 Va.c.	satisfactorily operate
		DC	85 %	187 Vd.c.	satisfactorily operate
			100 %	220 Vd.c.	satisfactorily operate
			110 %	2402 Vd.c.	satisfactorily operate
	Overload release test	Long-time delay		1 140 A	179 s
		Short-time delay		2 510 A	0.1 s

**Verdict****Passed**

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Standard	IEC 60068-2-1: 2007, Testing specification of client	Ambient temperature & humidity in Lab.	+ 14 °C, 11 %R.H.
Test date	2008.01.30 ~ 01.31	Tested by	Kim, Myoung-Seok

## 2) Intermediate measurement

Sample number	Verification of test items				Results
#1	Normal operational test				satisfactorily operate
	Auxiliary switch operating			AX	satisfactorily operate
				AL	satisfactorily operate
	Shunt release test (SHT)	AC	85 %	154 Va.c.	satisfactorily operate
			100 %	220 Va.c.	satisfactorily operate
			110 %	264 Va.c.	satisfactorily operate
		DC	85 %	175 Vd.c.	satisfactorily operate
			100 %	250 Vd.c.	satisfactorily operate
			110 %	275 Vd.c.	satisfactorily operate
	Motor operator (MOP)	AC	85 %	196 Va.c.	satisfactorily operate
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		DC	85 %	187 Vd.c.	satisfactorily operate
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**Verdict****Passed**



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## 4. Test results

## 3) Final measurement

Sample number	Verification of test items			Results
#1	Visual inspection			Not visible harm
	Overload release test	Long-time delay	1 096 A	214 s
		Short-time delay	2 450 A	114 ms

**Verdict****Passed**



## Photograph



Photo. 1. test arrangement of outer chamber  
- Programmable power source and temperature chamber

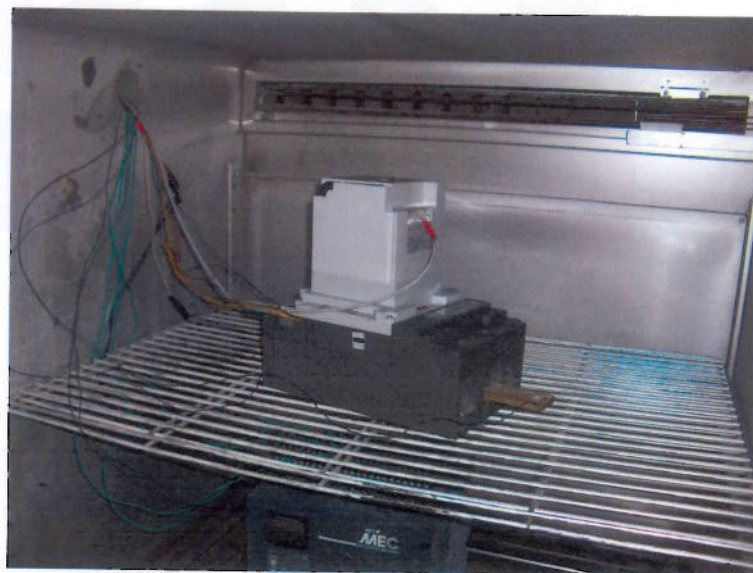


Photo. 2. test arrangement of inner chamber

**Photograph**

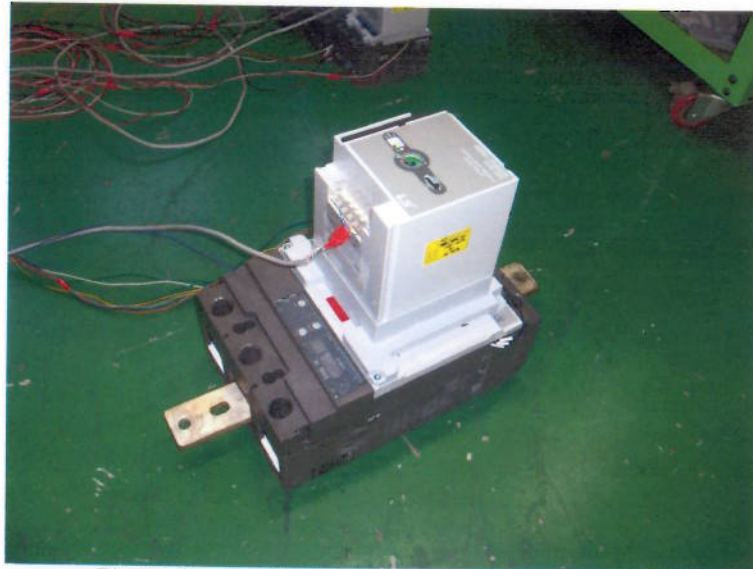


Photo. 3. after the test, the apparatus outer view



Photo. 4. overload release test; single phase

**Photograph**

Photo. 5. oscilogram of the overload release test