Record of Test Results

TEST OBJECT Bushing

DESIGNATION CableMate cat# TDBAL

28 kV 600 A 60 Hz

APPLICANT PYUNGIL Co.,Ltd.
9-30, Gwanak-daero 434beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Korea

MANUFACTURER PYUNGIL Co.,Ltd.
9-30, Gwanak-daero 434beon-gil, Dongan-gu, Anyang-si, Gyeonggi-do, Korea

DATE OF TESTS 2019-09-30 ~ 2019-10-08

ISSUED NUMBER 19DC201638-R1

The tests have been carried out in accordance with applicant's instructions.
This Record of Test Results applies only to the test object.
This Record of Test Results can be used for information only.
This Record of Test Report comprises 15 sheets in total.

Prepared by Kwon, Tae-jin

Approved by (Technical manager) Kim, Geun-yong

Date of issue **2019-11-21**

Date of reissue **2019-12-27**

President

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Contents

Ratings

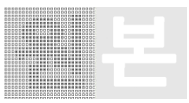
N.A.

Identification of test object

Assigned by manufacturer

Bushing

Manufacturer	PYUNGIL Co.,Ltd.
Designation	CableMate cat# TDBAL
Serial No.	#1, #2, #3
Voltage	28 kV
Current	600 A
Frequency	60 Hz



General

Tested by :

Kwon, Tae-jin KERI

Witnessed by :

N.A.

Measurement uncertainty

N.A.

The others

These tests were carried out on the test objects submitted by the applicant.

Test results

	Test item	Location	Page
1	Power-frequency dry voltage withstand tests	KERI-C2	7
2	DC voltage withstand tests	KERI-C2	8
3	Lightning impulse voltage withstand tests	KERI-C2	9
4	Measurement of partial discharge quantity	KERI-C2	13

KERI-C2 : KERI High Voltage Evaluation Division(Ansan)

1. Power-frequency dry voltage withstand tests

Test Date 2019-09-30

Test conditions

Atmospheric conditions	22.6 °C, 61.2 % R.H., 1 004 hPa
Atmospheric correction factor	N.A.
Test voltages	60 kV
Test frequency	60 Hz
Test duration	1 min

Test results

Voltage applications	Serial no.	Test results
Between bushing conductor and flanges	#1	Withstood
	#2	Withstood
	#3	Withstood

Remarks

This test was carried out on the test object one side installed with insulated connector and the other side with flanges in oil-immersed enclosure.

2. DC voltage withstand tests

Test Date 2019-09-30

Test conditions

Atmospheric conditions	22.4 °C, 61.2 % R.H., 1 004 hPa
Test voltages	DC 78 kV
Test duration	15 min

Test results

Voltage applications	Serial no.	Test results
Between bushing conductor and flanges	#1	Withstood
	#2	Withstood
	#3	Withstood

Remarks

This test was carried out on the test object one side installed with insulated connector and the other side with flanges in oil-immersed enclosure.

3. Lightning impulse voltage withstand tests

Test Date 2019-09-30

Test conditions

Atmospheric conditions	24.4 °C, 65.5 % R.H., 1 014 hPa
Atmospheric correction factor	N.A.
Test voltages	140 kV
Wave shape	(1.2/50) µs
Polarity	Positive and negative
Number of shots	3 shots respectively

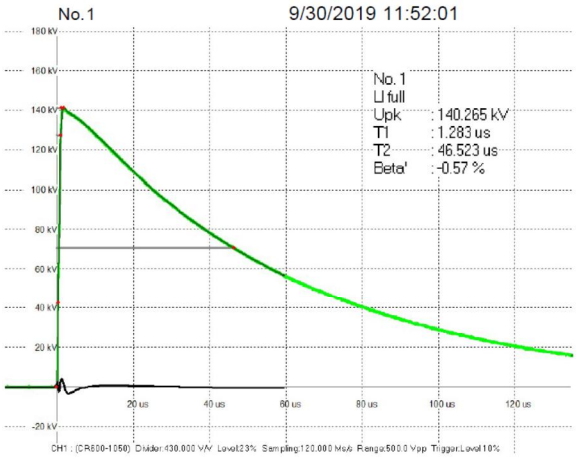
Test results

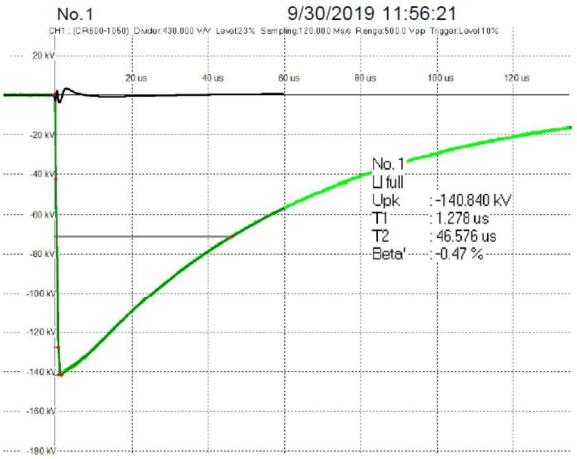
Voltage applications	Serial no.	Test results	Test No.
Between bushing conductor and flanges	#1	Withstood	01
	#2		02
	#3		03

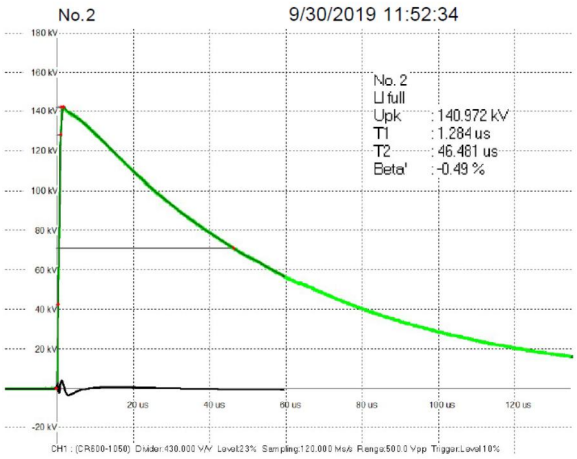
Remarks

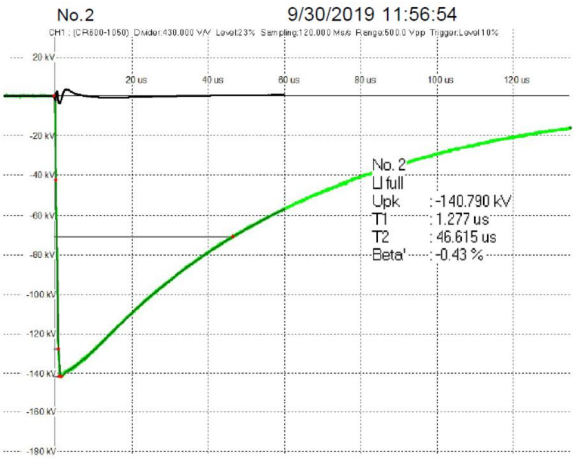
This test was carried out on the test object one side installed with insulated connector and the other side with flanges in oil-immersed enclosure.

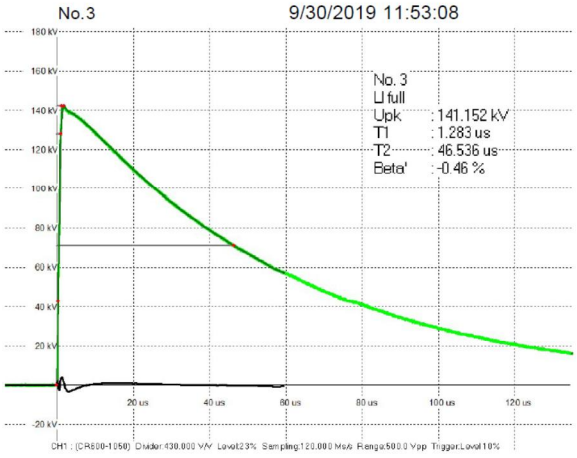
Oscillograms

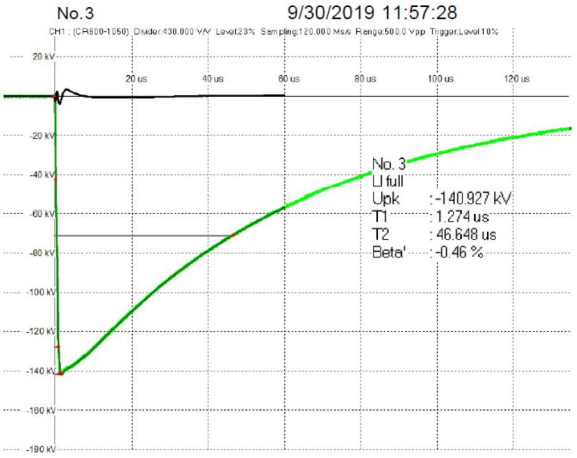






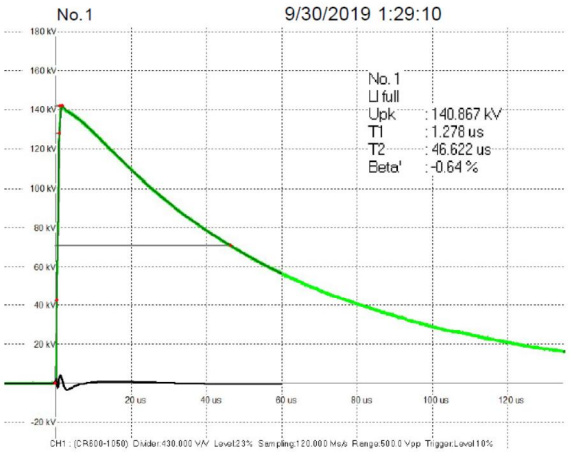


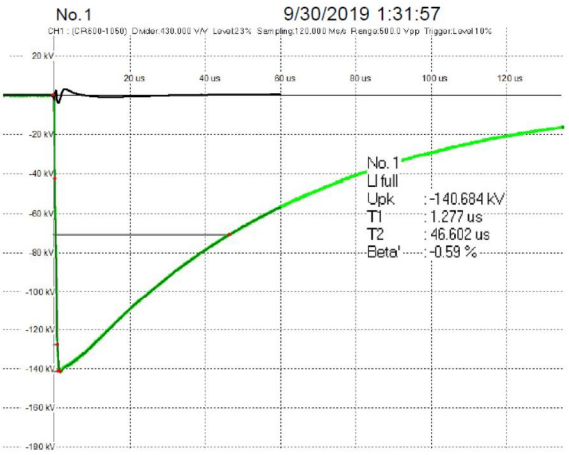


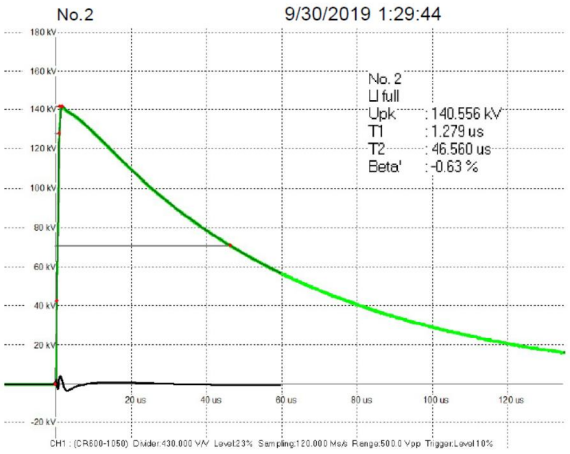


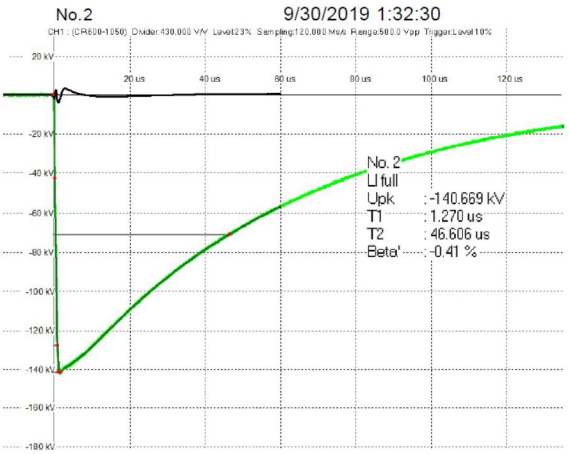
Test No. 01

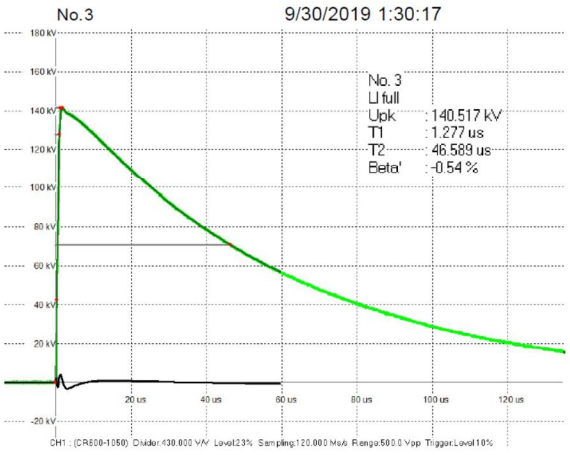
Oscillograms

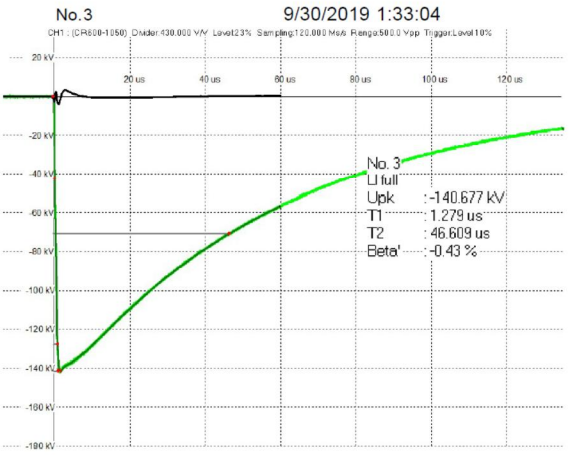






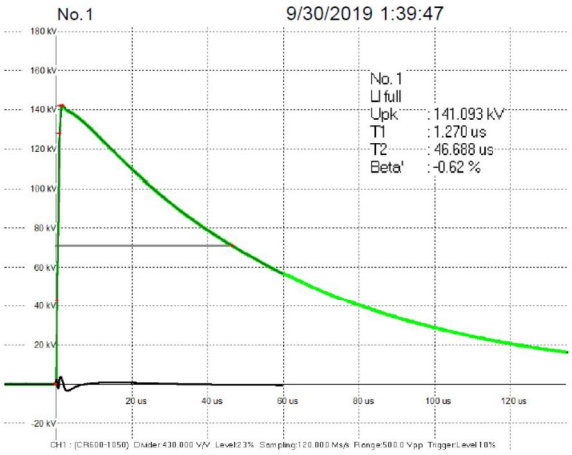


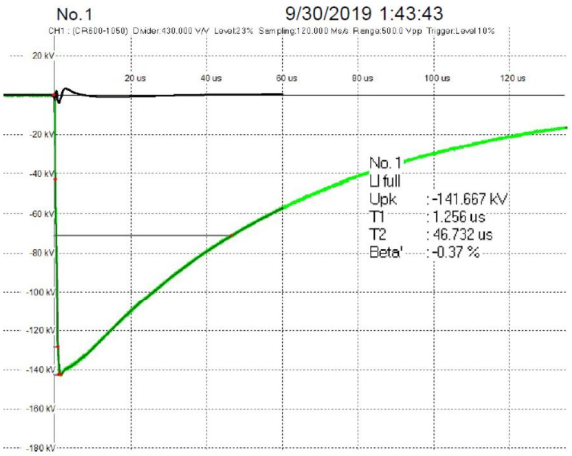


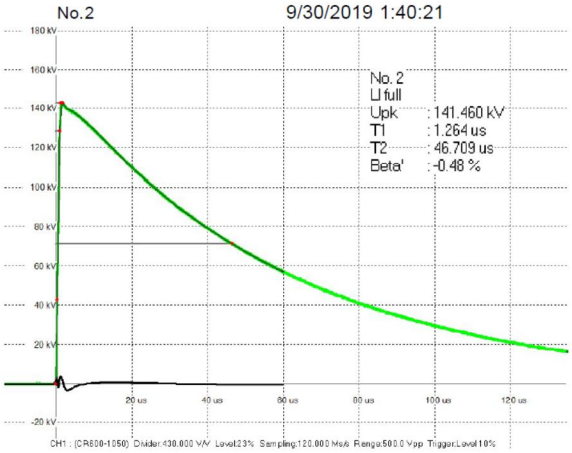


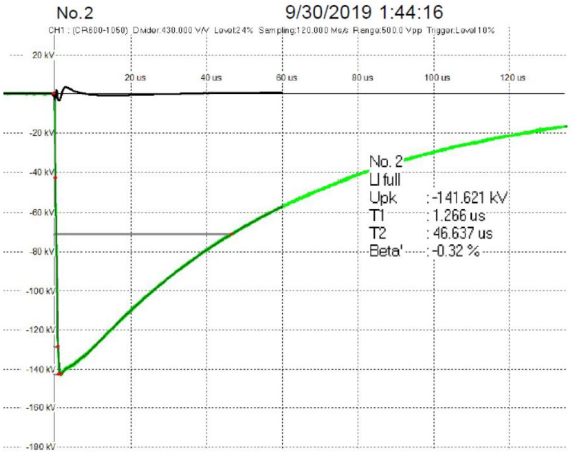
Test No. 02

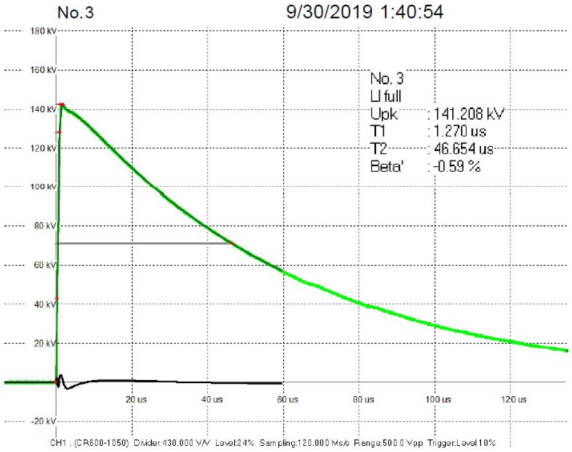
Oscillograms

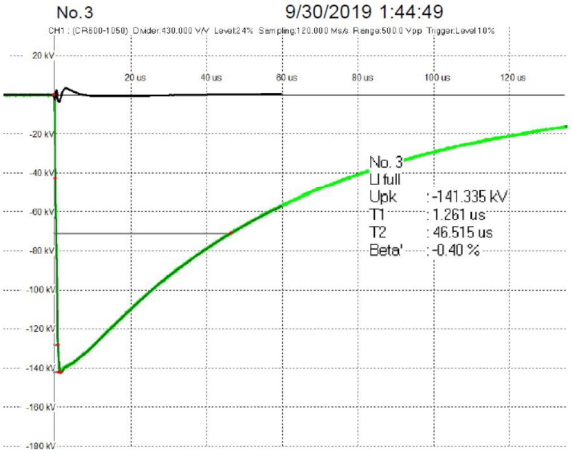












Test No. 03

4. Measurement of partial discharge quantity

Test Date 2019-10-08

Test conditions

Atmospheric conditions	23.5 °C, 62.5 % R.H., 1 009 hPa
Specified voltage (U_m)	21.5 kV
Specified test voltages and duration	
$1.2 \times U_m$	25.8 kV 60 s
$1.0 \times U_m$	21.5 kV 60 s
Test frequency	60 Hz
Background noise	0.6 pC

Test requirements

The test voltage shall be raised to $1.2 \times U_m$(=25.8 kV). If partial discharge exceeds 5 pC, the test voltage shall be lowered to $1.0 \times U_m$(=21.5 kV) and shall be maintained at this level for 60 s. Partial discharge level shall not exceed 5 pC during this period.

Test results

Voltage applications	Serial no.	Test voltages	Maximum permissible PD quantity pC	Measured PD quantity pC
Between bushing conductor and flanges	#1	$1.2 \times U_m$	-	Less than 0.6
		$1.0 \times U_m$	5	-
	#2	$1.2 \times U_m$	-	Less than 0.6
		$1.0 \times U_m$	5	-
	#3	$1.2 \times U_m$	-	Less than 0.6
		$1.0 \times U_m$	5	-

Remarks

This test was carried out on the test object installed with shield cap to bushing built in stud.

Attachment

Photo_Test object

INFORMATION SHEET

KERI(Korea Electrotechnology Research Institute) issues Type Test Certificate, Type Test Report, Test Report, and Record of Test Results as below.

1 Type Test Certificate
A Certificate contains records of the highest quality of Type Tests carried out at KERI premises strictly in accordance with STL Guide based on IEC, and/or regional standards and national standards that are identical to IEC standards. The test object has fulfilled the requirements of the standards and the relevant ratings assigned by the applicant are endorsed by KERI.

2 Type Test Report
A Type Test Report contains records of a complete series of Type Tests carried out strictly by applying standards recognized by KERI. The test object has fulfilled the requirements of the standards and the relevant ratings assigned by the applicant are endorsed by KERI.

3 Test Report
A Test Report contains records of one or more tests that are carried out according to recognized standards. But these tests are not fulfilled requirements of complete Type Tests. The test results do not guarantee ratings of the test object.

4 Record of Test Results
A Record of Test Results is a record of the results performed in accordance with the specifications or instructions presented by the applicant in the case that the number of tests, test procedures and/or test parameters do not fulfil the recognized standards.

- KERI is a member of STL(Short-circuit Testing Liaison) and the accredited testing laboratory under Clause 2 of Article 2 in “Guidelines on certified testing criteria and methods for electrical equipment” (Public Notice, Ministry of Trade, Industry and Energy, KOREA).

- The authenticity of the test results can be identified and confirmed directly by using the 2D bar code printed at the bottom of the report at http://trca.keri.re.kr/ptl/main/index.do. For further information, please visit KERI website(www.keri.re.kr) or contact KERI customer support department(Changwon: +82-55-280-2410, Ansan: +82-31-8040-4492).

End.