

Record of Test Results

TEST OBJECT Bushing well

DESIGNATION CableMate cat#BWL T
28 kV 200 A 50 Hz/60 Hz

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

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

DATE OF TESTS 2020-09-21 ~ 2020-10-08

ISSUED NUMBER 21DC200024

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 Results comprises 24 sheets in total.

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Prepared by



Lee, Jin-woo

Approved by
(Technical manager)



Kim, Geun-yong

Date of issue

2021-01-13

President

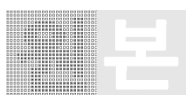


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[DF-HH-7081-08/01]



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Ratings

N.A.



Identification of test object

Assigned by manufacturer

Bushing well

Manufacturer	PYUNGIL Co.,Ltd.
Designation	CableMate cat#BWL
Serial No.	#1, #2, #3, #4, #5, #6, #7, #8
Rated voltage	28 kV
Rated current	200 A
Rated frequency	50 Hz/60 Hz



General**Approved by :**

Kim, Geun-yong

High Voltage Laboratory (Ansan)

Jung, Heung-soo

High Power Laboratory (Uiwang)

Tested by :

Kim, Hyun-dong

High Power Laboratory (Uiwang)

Cho, Jeong-hyeok

High Voltage Laboratory (Ansan)

Witnessed by :

N.A.

Measurement uncertainty

N.A.



The others

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



Test results

	Test item	Location	Page
1	Partial discharge test	KERI-C2	8
2	AC withstand voltage test	KERI-C2	9
3	Impulse withstand voltage test	KERI-C2	10
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5	DC withstand voltage test	KERI-C2	15
6	Short-time current test	KERI-B2	16

KERI-B2 : KERI High Power Evaluation Division(Uiwang)

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



1. Partial discharge test

Test Date 2020-09-21

Test conditions

Atmospheric conditions	24.2 °C, 43 % R.H., 1 014.6 hPa
Test voltage	25.8 kV
Test frequency	60 Hz
Voltage application	Between parts of connector and metallic supporting structure
Background noise	1 pC

Test requirements

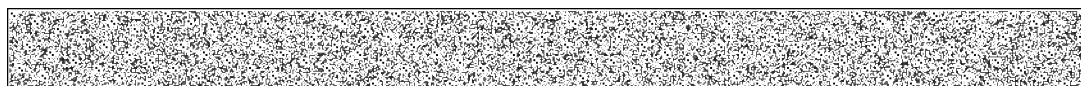
If the test voltage 25.8 kV applied to specimen, The partial discharge peak value shall be less than 3 pC. If the partial discharge peak value exceeds 3 pC, The test voltage shall be lowered to 21.5 kV and shall be maintained for at least 3 s but not more than 60 s. Partial discharge peak value shall not exceed 3 pC during the interval 3 s to 60 s.

Test results

Specimen no.	Test results
#1	Less than 1 pC
#2	Less than 1 pC
#3	Less than 1 pC

Remarks

The tests were performed while bottom of the specimen was immersed in insulating oil.



2. AC withstand voltage test

Test Date 2020-09-21

Test conditions

Atmospheric conditions	24.2 °C, 43 % R.H., 1 014.6 hPa
Atmospheric correction factor	0.989
Test voltage	60 kV
Test frequency	60 Hz
Test duration	1 min
Voltage application	Between parts of connector and metallic supporting structure

Test results

Specimen no.	Test results
#1	Withstood
#2	Withstood
#3	Withstood

Remarks

The tests were performed while bottom of the specimen was immersed in insulating oil.



3. Impulse withstand voltage test

Test Date 2020-09-21

Test conditions

Atmospheric conditions	24.2 °C, 43 % R.H., 1 014.6 hPa
Atmospheric correction factor	0.987
Test voltage	125 kV
Wave shape	(1.2/50) μ s
Polarity	Positive and negative
Voltage application	Between parts of connector and metallic supporting structure
Number of shots	3 shots repectively

Test results

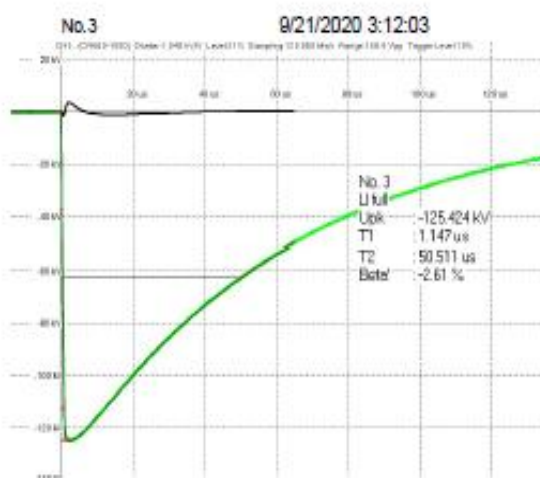
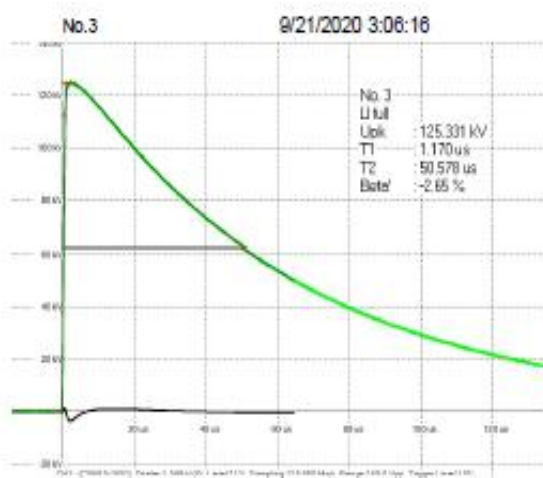
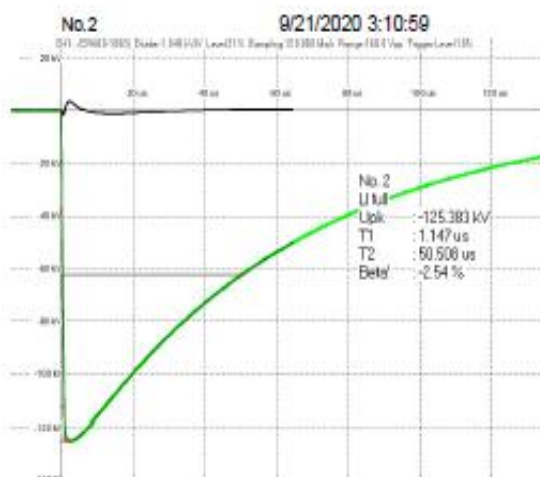
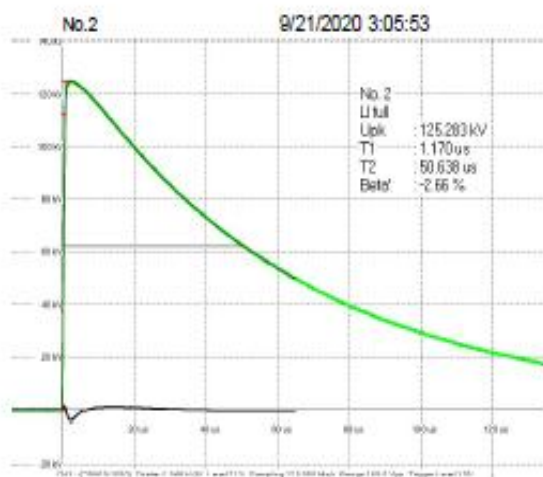
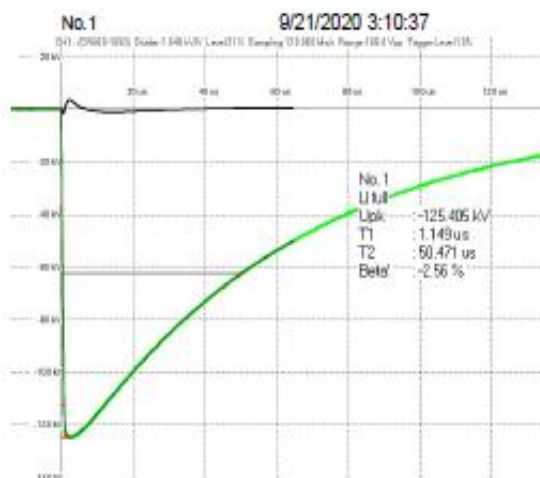
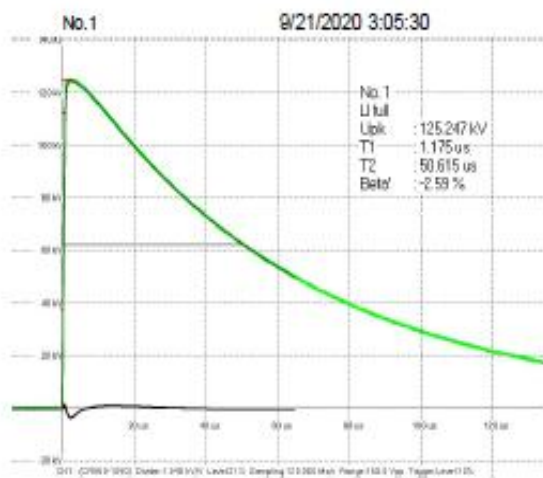
Specimen no.	Test results	Osc. No.
#1	Withstood	01
#2	Withstood	02
#3	Withstood	03

Remarks

The tests were performed while bottom of the specimen was immersed in insulating oil.

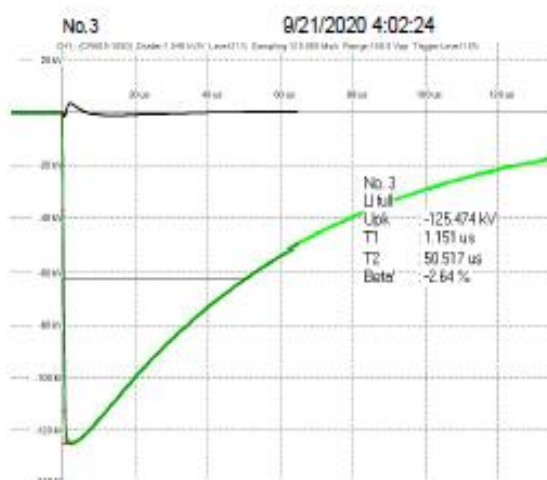
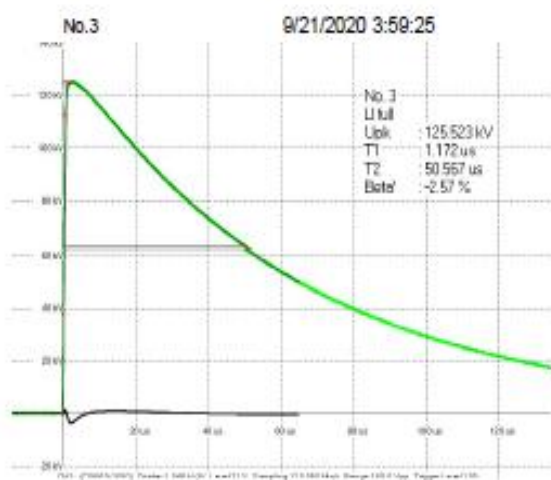
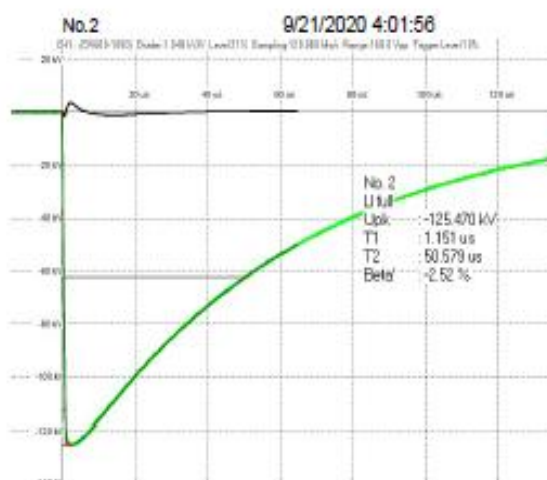
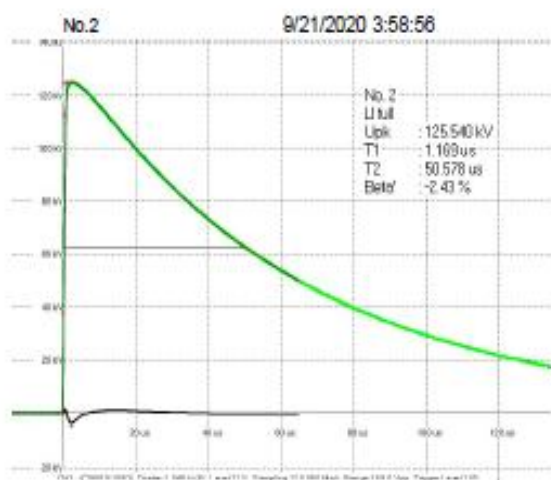
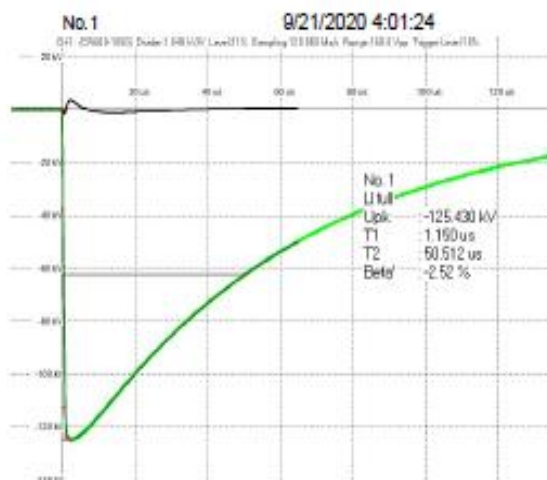
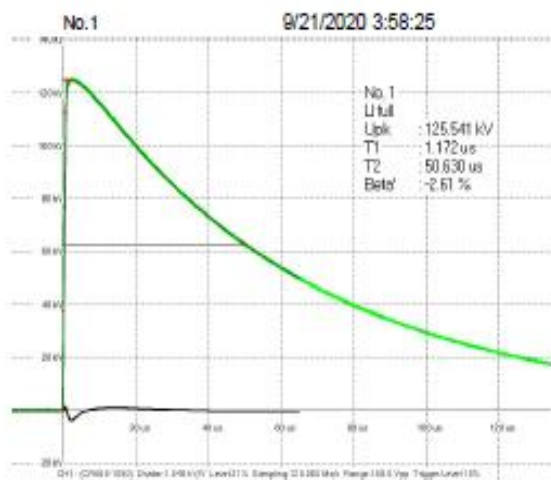


Oscilloscope



Osc. No. 01

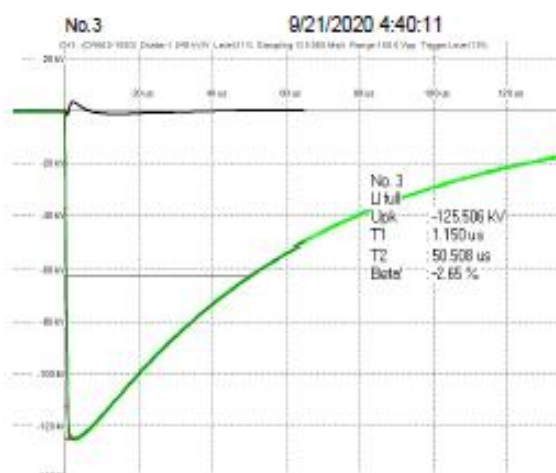
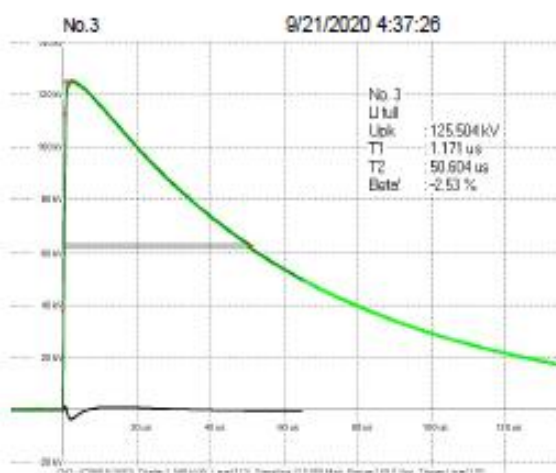
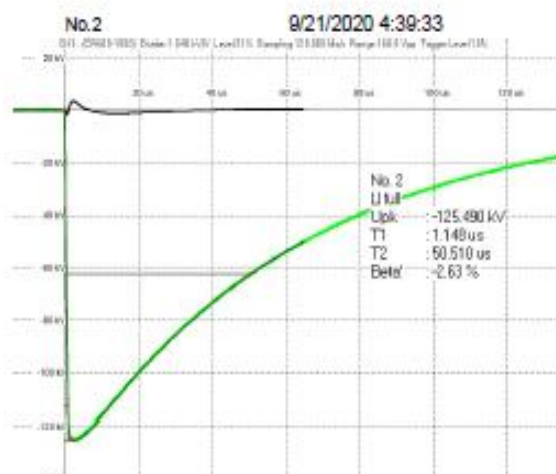
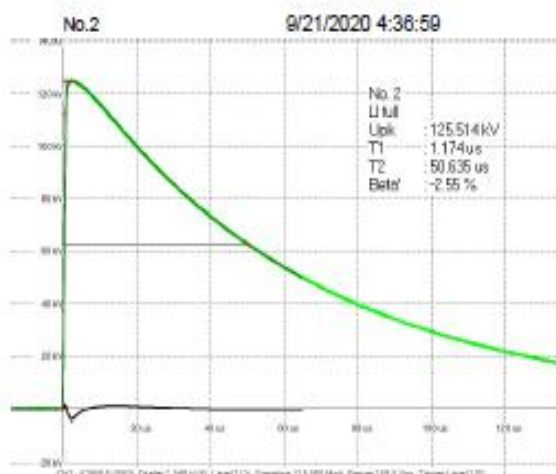
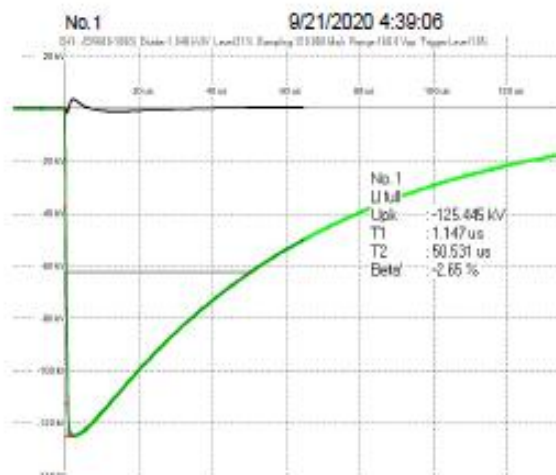
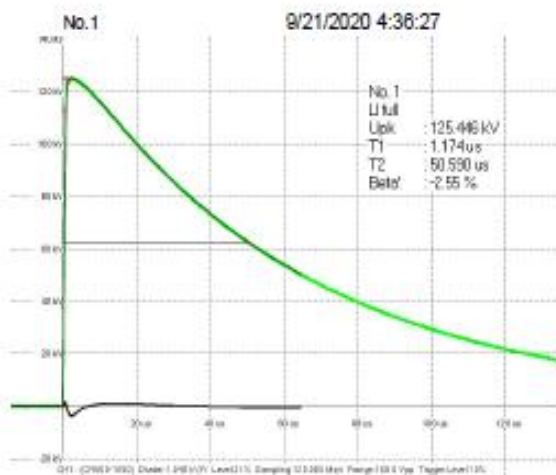
Oscilloscope



Osc. No. 02



Oscilloscope



Osc. No. 03



4. Bushing well stud torque test

Test Date 2020-09-22

Test conditions

Test method IEEE std 386:2016, Subclause 7.19

Tightening torque 23 N · m

Test requirements

The 3/8" - 16 UNC threaded stud in the bushing well shall withstand a minimum torque 23 N · m without stripping of fracturing.

Test results

Specimen no.	Test results
#4	Withstood
#5	Withstood
#6	Withstood



5. DC withstand voltage test

Test Date 2020-09-21

Test conditions

Atmospheric conditions 24.2 °C, 43 % R.H., 1 014.6 hPa
Atmospheric correction factor 0.987
Test voltage 78 kV
Test duration 15 min

Test results

Specimen no.	Test results
#1	Withstood
#2	Withstood
#3	Withstood

Remarks

The tests were performed while bottom of the specimen was immersed in insulating oil.



6. Short-time current test

Test Date 2020-10-08

Test conditions

New and clean

Serial number #7, #8

Test current

Fault-closure current rating 12.5 kA (28.375 kAp)

Short-time current rating 3.5 kA (7.945 kAp)

Frequency 60 Hz

X/R 6

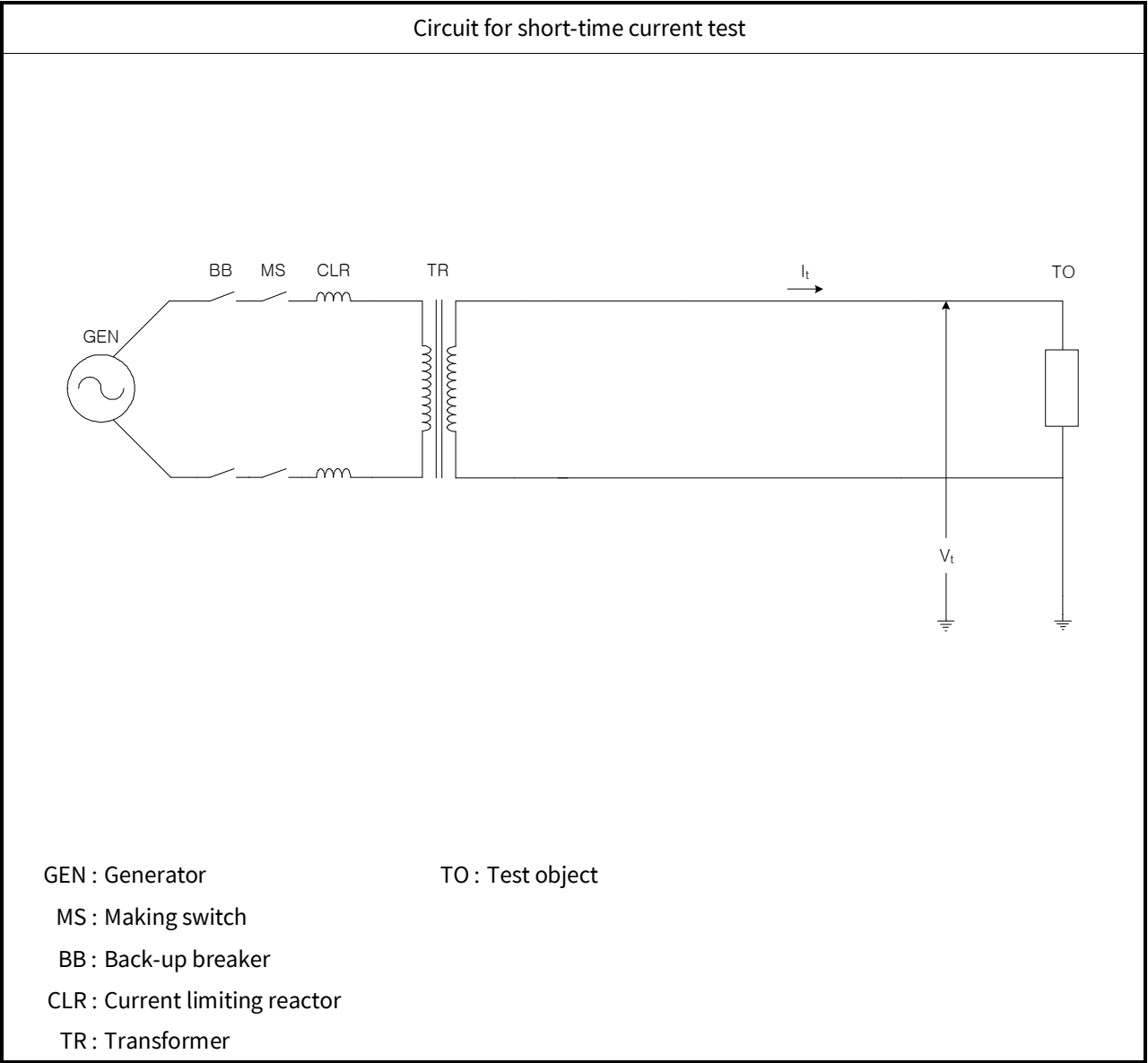
Duration

Fault-closure current rating 0.17 s

Short-time current rating 3 s



Test circuit



Supply circuit			Load circuit		
Frequency	Hz	60	Short-circuit point	earthed	

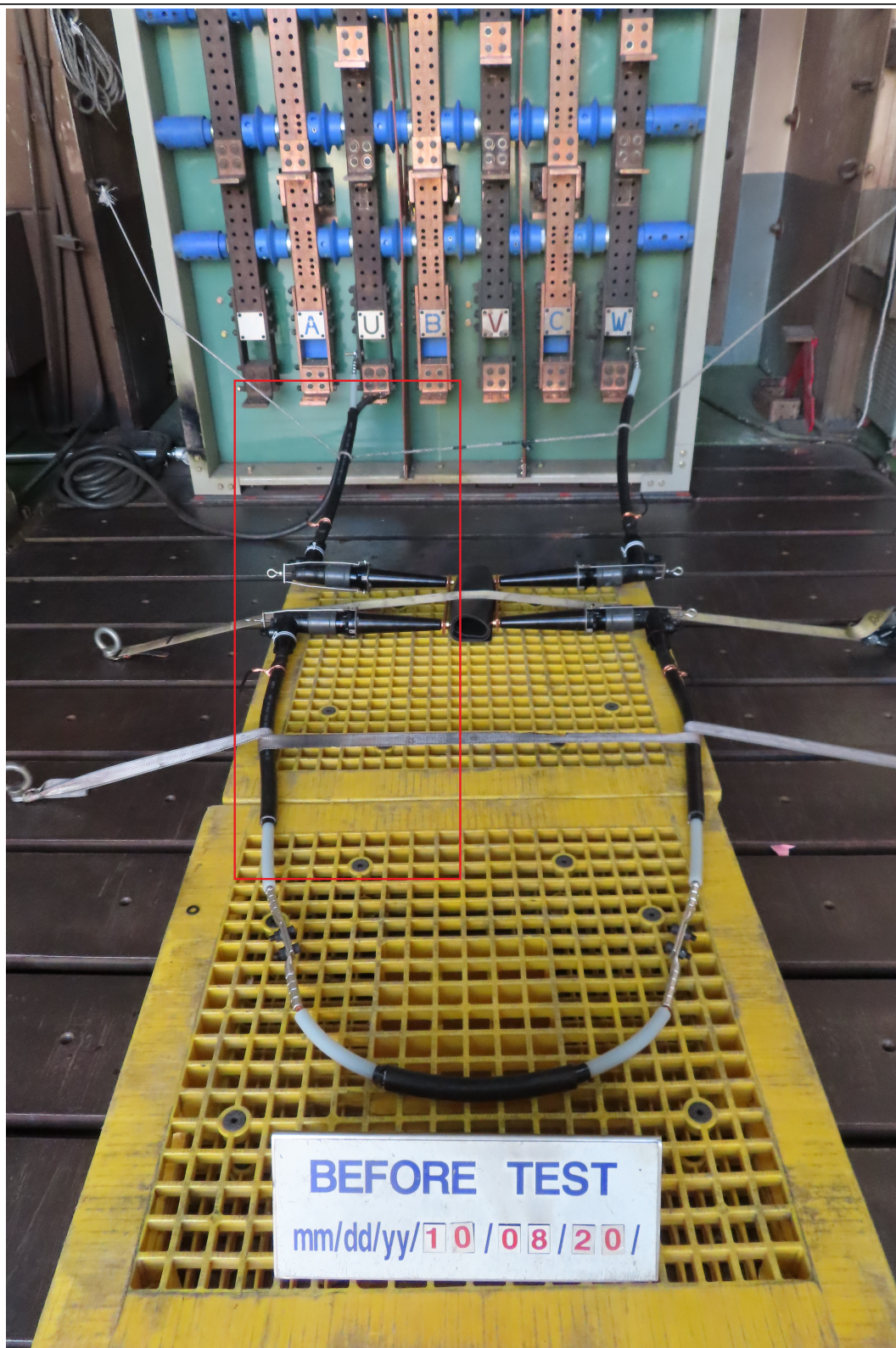


Test results

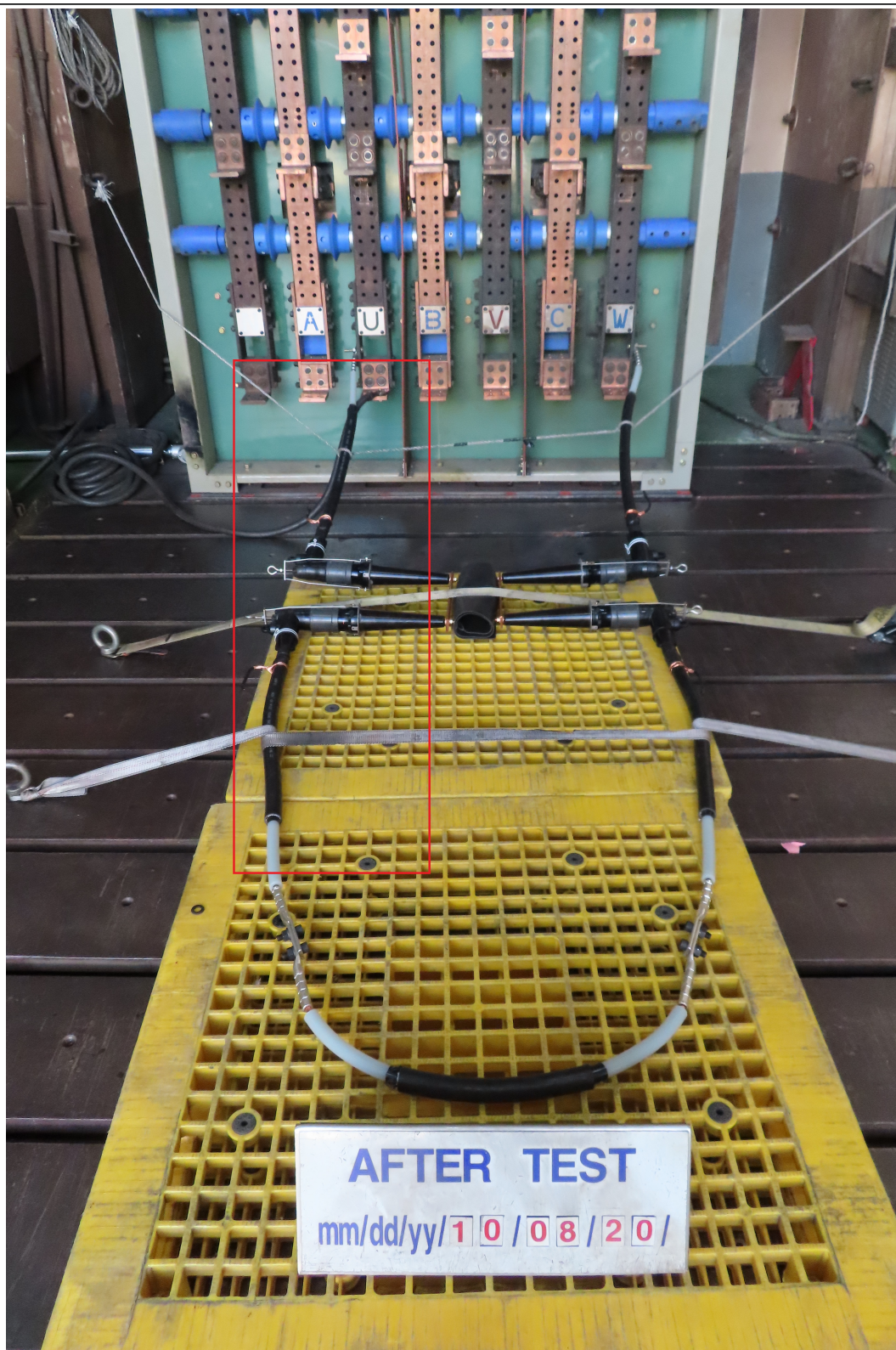
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Peak current	kA	-29.6	-8.5	-	-	-
Short-time current	kA	12.6	3.7	-	-	-
Duration	s	0.2	3.0	-	-	-

Remark	
HT20A2I02074-005	Fault-closure current rating
HT20A2I02074-006	Short-time current rating



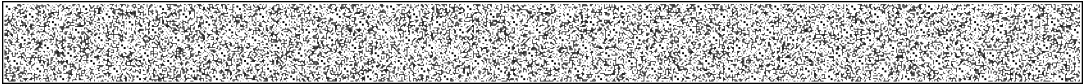
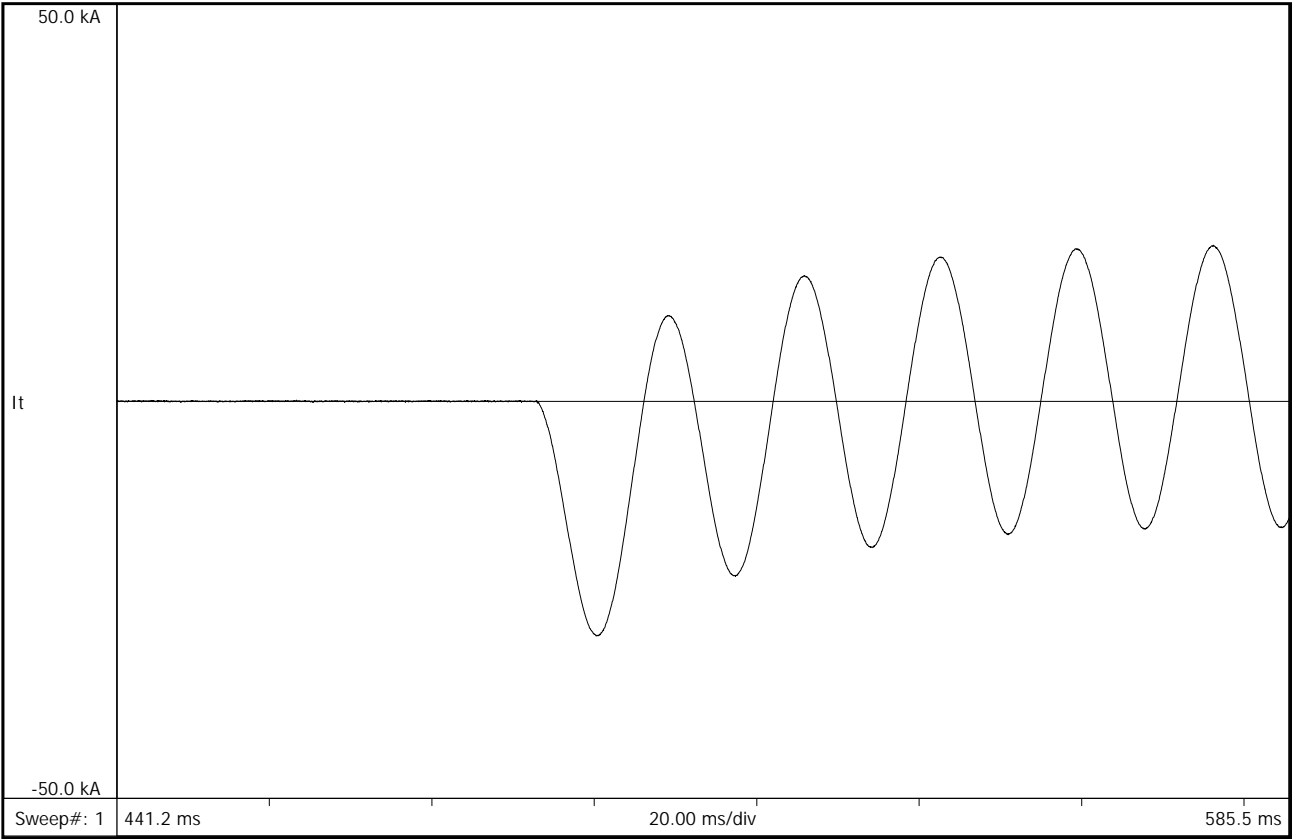
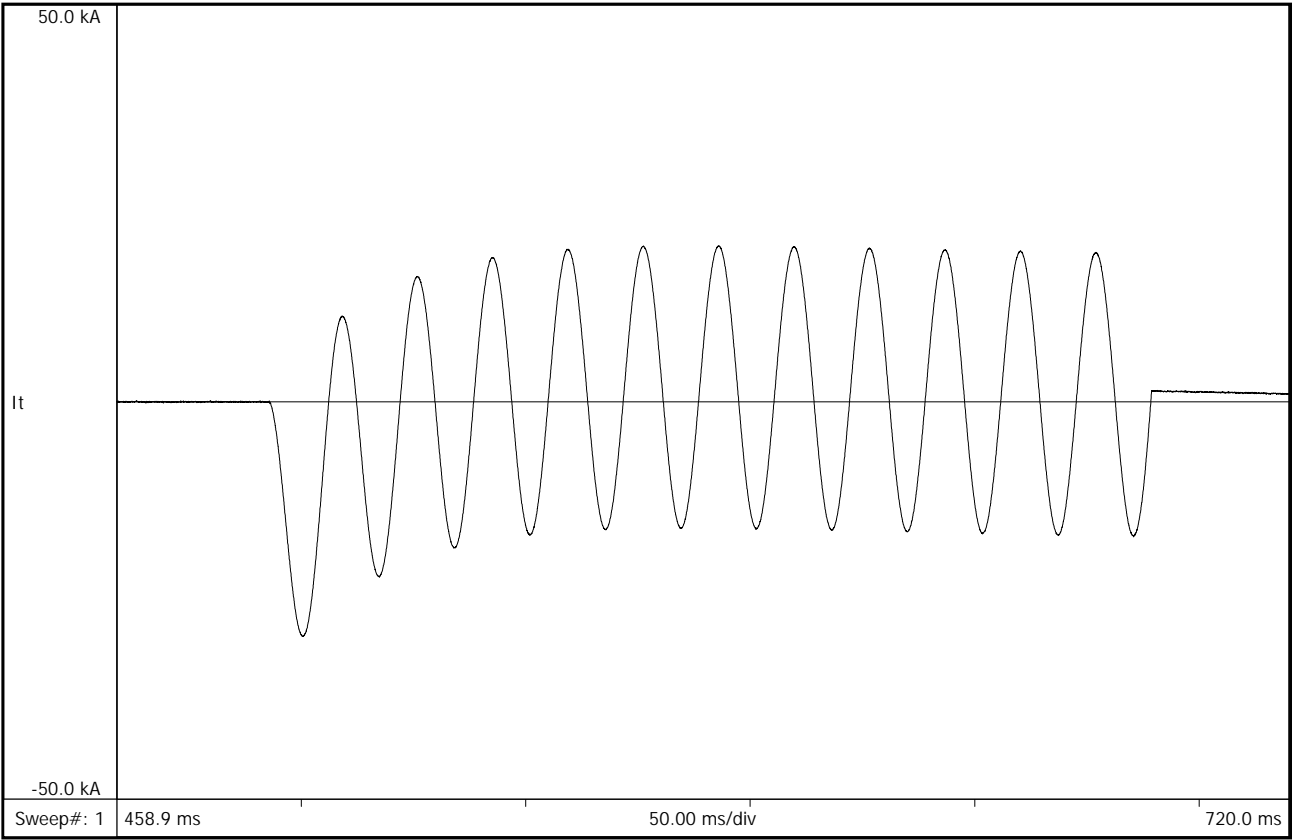
Photos

Before short-time current test

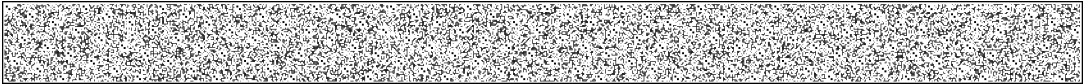
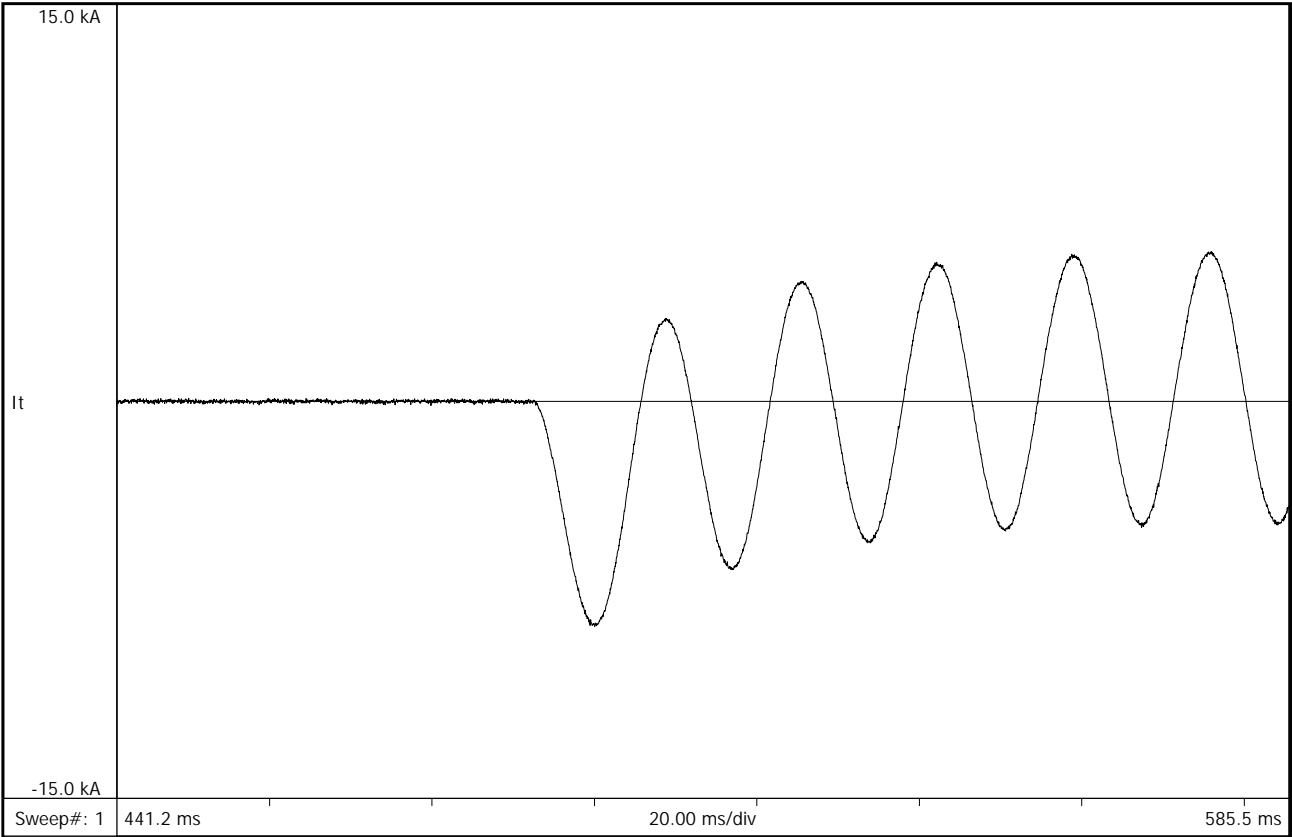
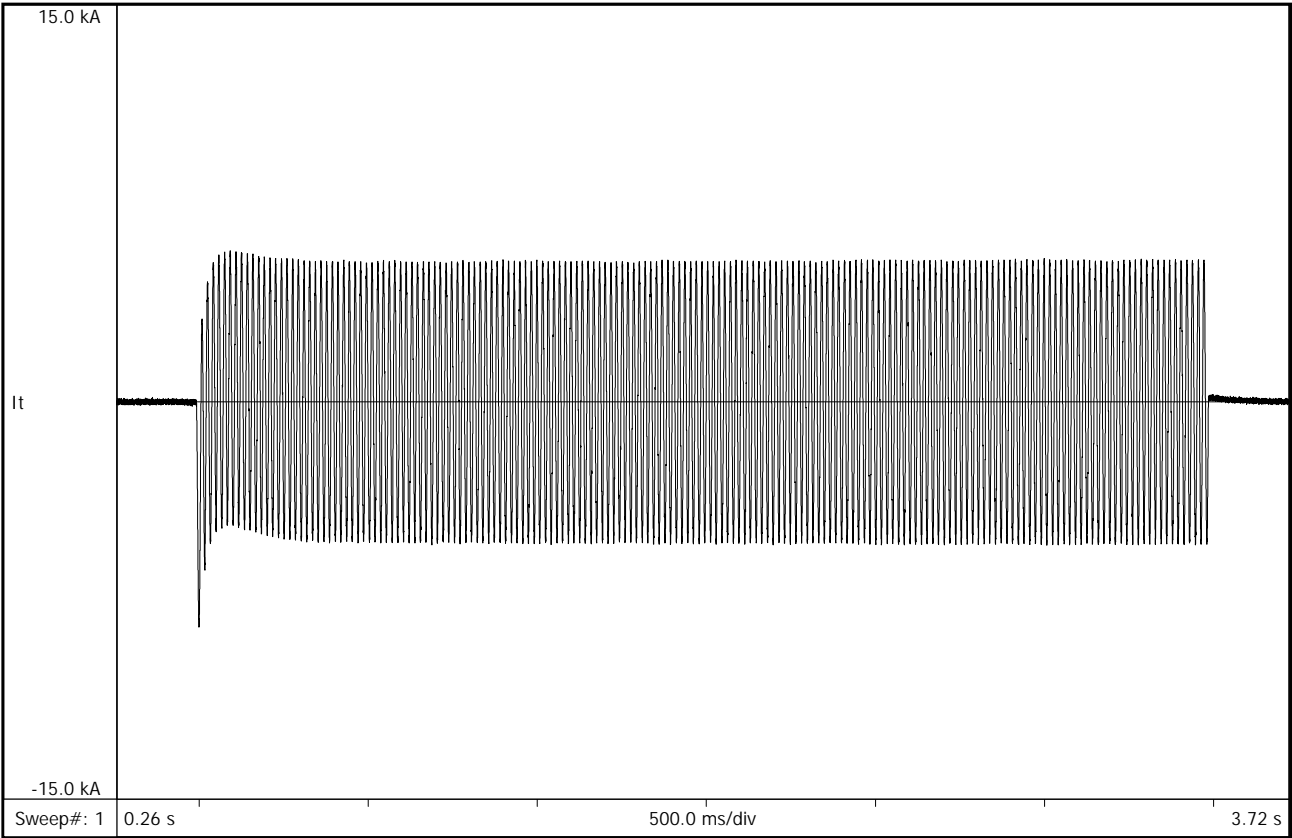
Photos

After short-time current test

Osc. HT20A2I02074-005



Osc. HT20A2I02074-006



Attachment

Photo_Test object



INFORMATION SHEET

KERI(Korea Electrotechnology Research Institute) issues following types of Test Documents.

1. STL Type Test Certificate

This Certificate is the most prestigious records of Type Tests performed in compliance with IEC standards and regional or national standards that are identical to corresponding IEC standards following STL Guide and Rules. This Certificate provides the verification of the rated characteristics of the test object.

2. KERI Type Test Certificate

This Certificate is the records of Type Tests performed in compliance with IEC standards and regional or national standards that are identical to corresponding IEC standards following STL Rules and KERI certification procedures. This Certificate provides the verification of the rated characteristics of the test object.

3. Type Test Report

This Report is the records of a complete series of Type Tests performed in compliance with the authorized standard recognized by KERI following KERI Testing Regulations.

4. Test Report

This Report is the records of one or more tests performed in compliance with authorized standards.

5. Record of Test Results

This is the records of the performed tests according to the specifications or instructions presented by the applicant.

- The authenticity of the test results can be identified at <http://trca.keri.re.kr/ptl/main/index.do>. For further information, please visit KERI website(www.keri.re.kr) or contact Testing Coordination Department(+82-55-280-1111).

End.



Record of Test Results

TEST OBJECT Bushing well

DESIGNATION CableMate cat#BWL-T-R
28 kV 200 A 50 Hz/60 Hz

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

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

DATE OF TESTS 2020-09-22 ~ 2020-10-08

ISSUED NUMBER 21DC200023

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 Results comprises 17 sheets in total.

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Prepared by



Lee, Jin-woo

Approved by
(Technical manager)



Kim, Geun-yong

Date of issue

2021-01-13

President



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[DF-HH-7081-08/01]



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Ratings

N.A.



Identification of test object

Assigned by manufacturer

Bushing well

Manufacturer	PYUNGIL Co.,Ltd.
Designation	CableMate cat#BWLT-R
Serial No.	#1, #2, #3, #4, #5
Rated voltage	28 kV
Rated current	200 A
Rated frequency	50 Hz/60 Hz



General**Approved by :**

Kim, Geun-yong

High Voltage Laboratory (Ansan)

Jung, Heung-soo

High Power Laboratory (Uiwang)

Tested by :

Kim, Hyun-dong

High Power Laboratory (Uiwang)

Cho, Jeong-hyeok

High Voltage Laboratory (Ansan)

Witnessed by :

N.A.

Measurement uncertainty

N.A.



The others

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



Test results

	Test item	Location	Page
1	Bushing well stud torque test	KERI-C2	8
2	Short-time current test	KERI-B2	9

KERI-B2 : KERI High Power Evaluation Division(Uiwang)

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



1. Bushing well stud torque test

Test Date 2020-09-22

Test conditions

Test method IEEE std 386:2016, Subclause 7.19

Tightneing torque 23 N · m

Test requirements

The 3/8" - 16 UNC threaded stud in the bushing well shall withstand a minimum torque 23 N · m without stripping of fracturing.

Test results

Serial No.	Test results
#1	Withstood
#2	Withstood
#3	Withstood



2. Short-time current test

Test Date 2020-10-08

Test conditions

New and clean

Serial number #4, #5

Test current

Fault-closure current rating 12.5 kA (28.375 kAp)

Short-time current rating 3.5 kA (7.945 kAp)

Frequency 60 Hz

X/R 6

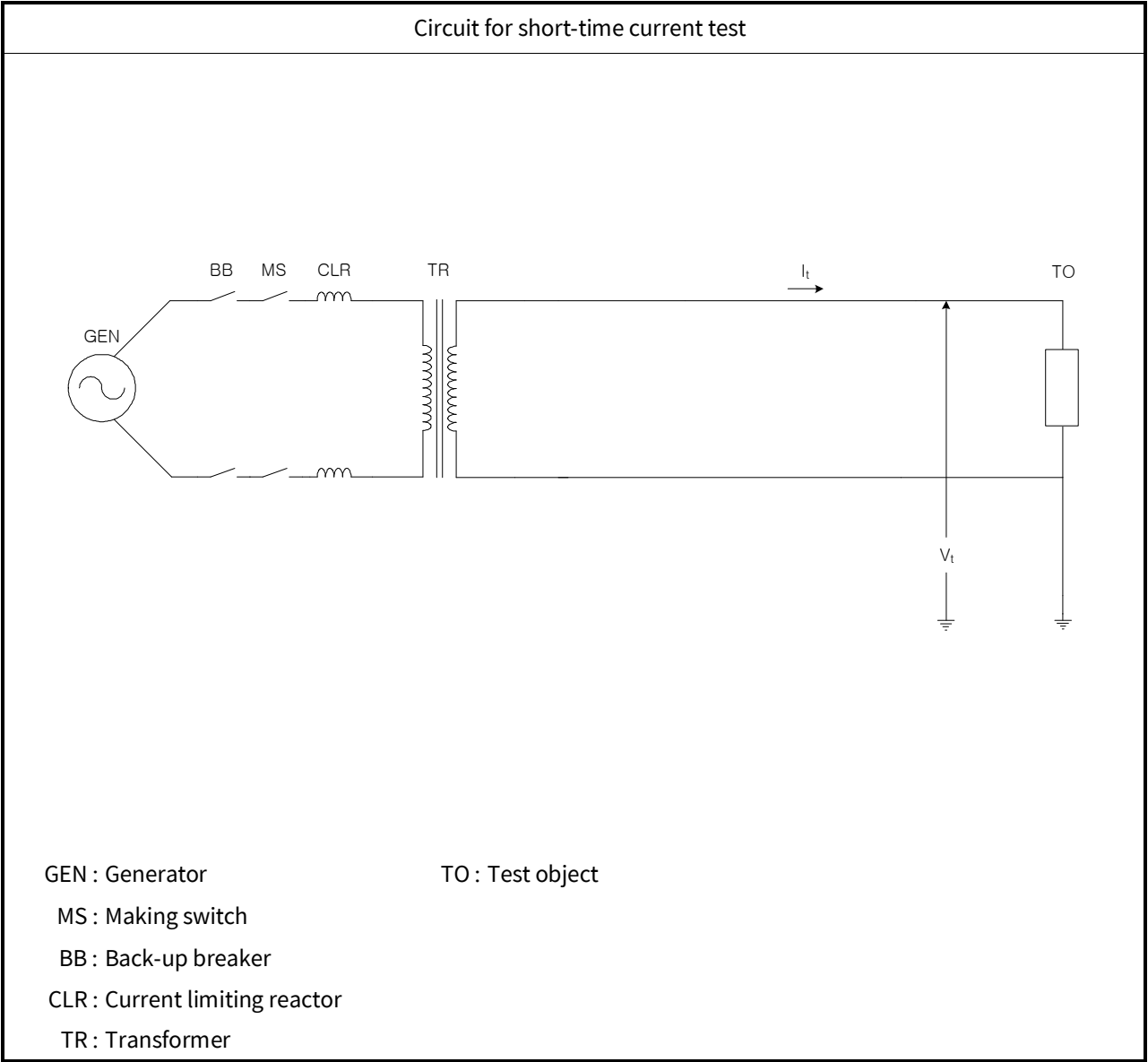
Duration

Fault-closure current rating 0.17 s

Short-time current rating 3 s



Test circuit



Supply circuit			Load circuit		
Frequency	Hz	60	Short-circuit point	earthed	

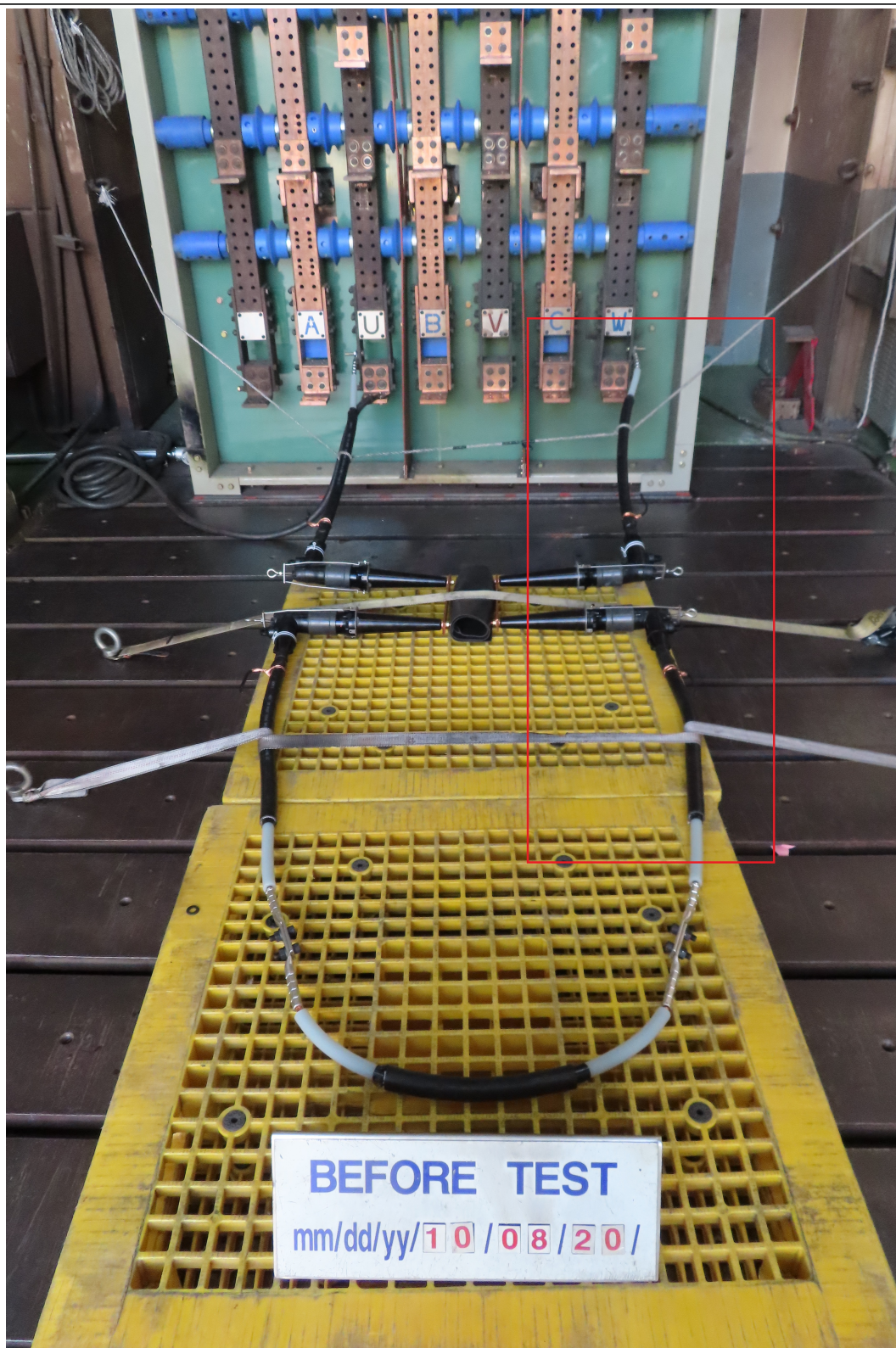


Test results

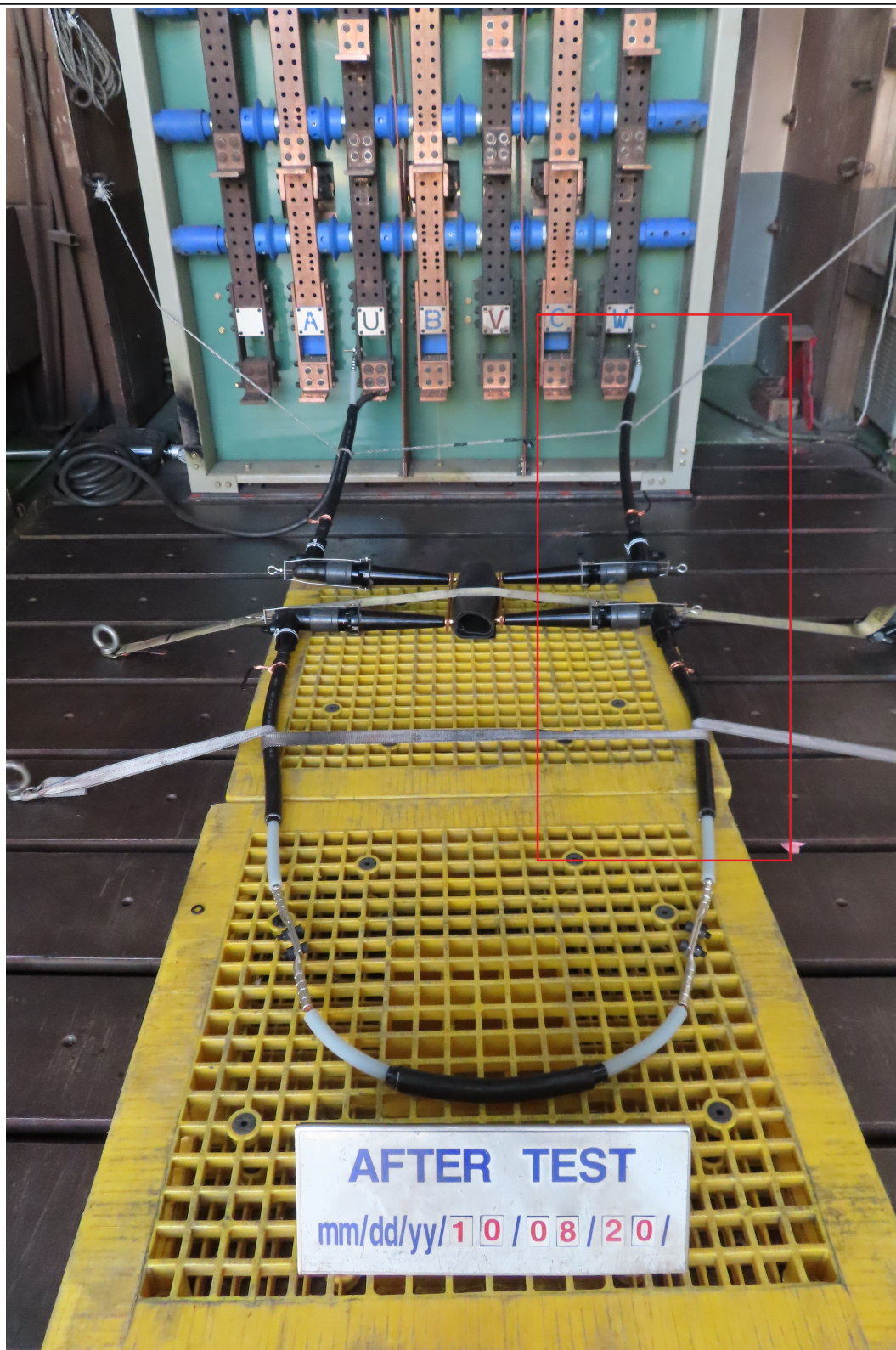
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Short-time current	kA	12.6	3.7	-	-	-
Duration	s	0.2	3.0	-	-	-

Remark	
HT20A2I02075-005	Fault-closure current rating
HT20A2I02075-006	Short-time current rating



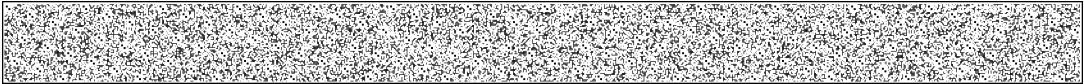
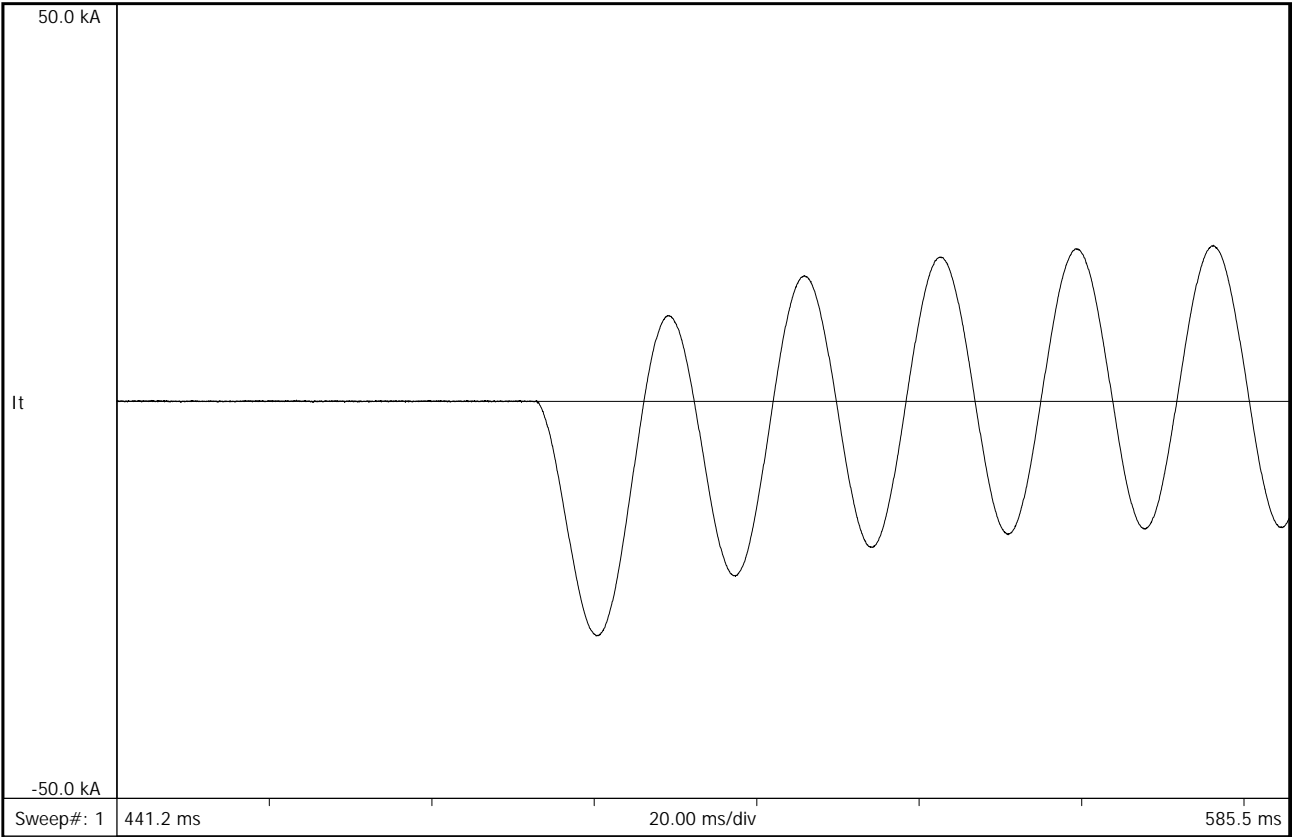
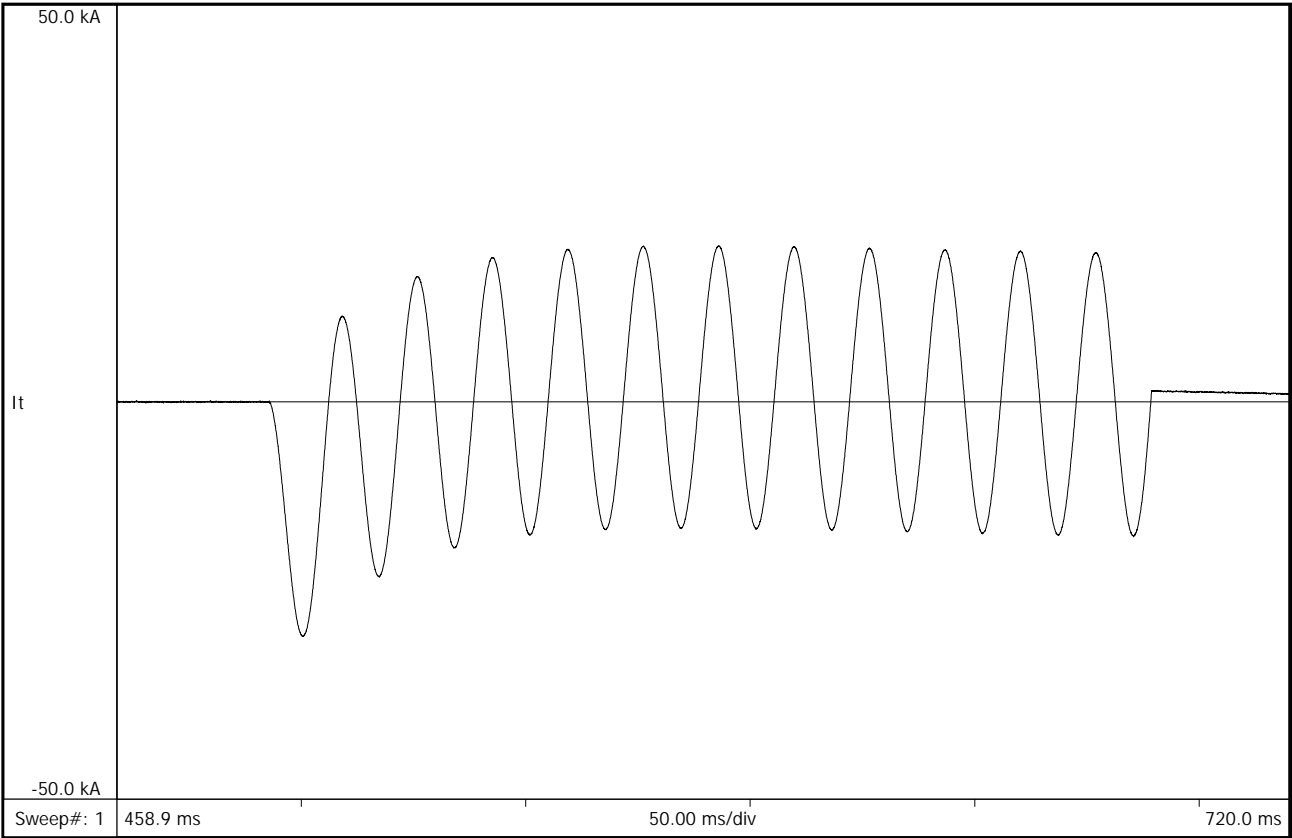
Photos

Before short-time current test

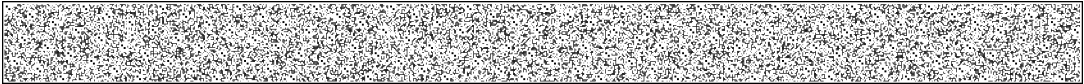
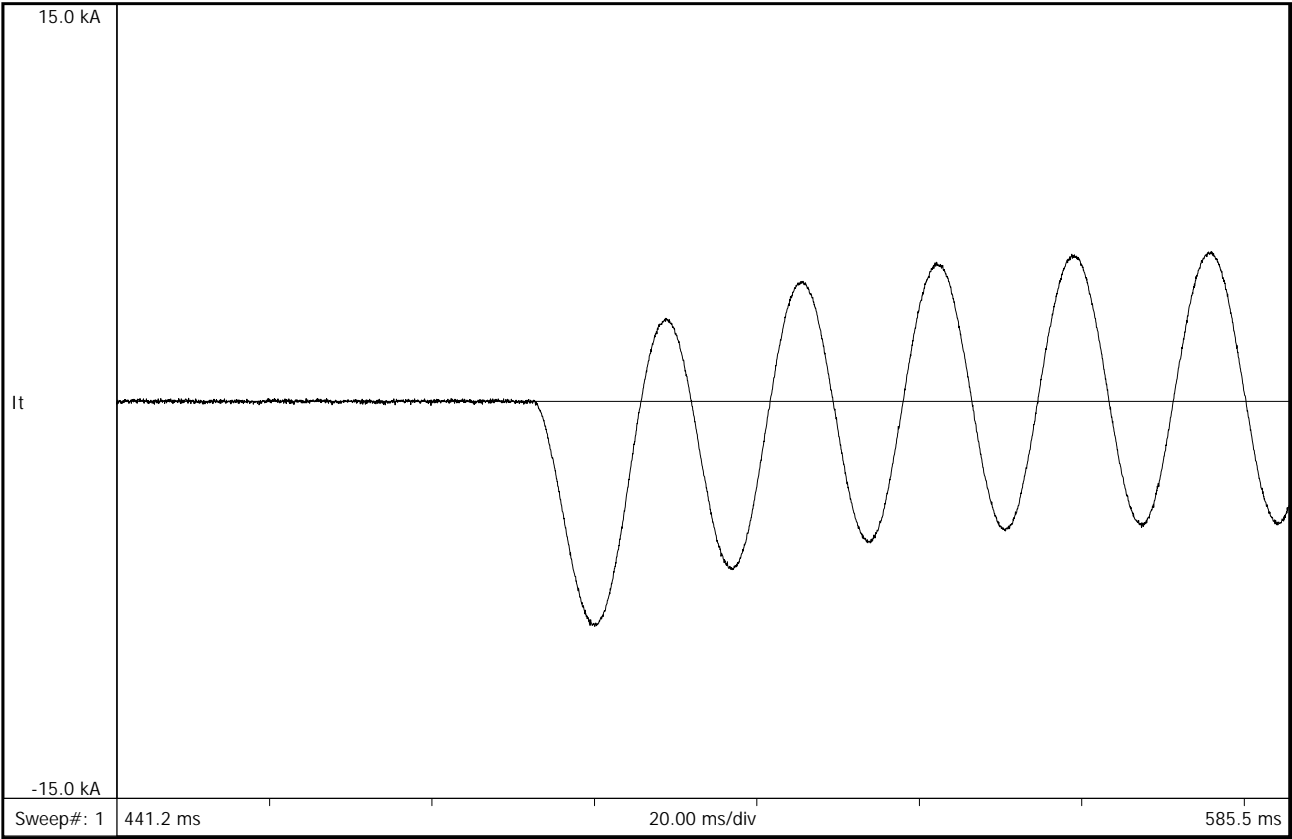
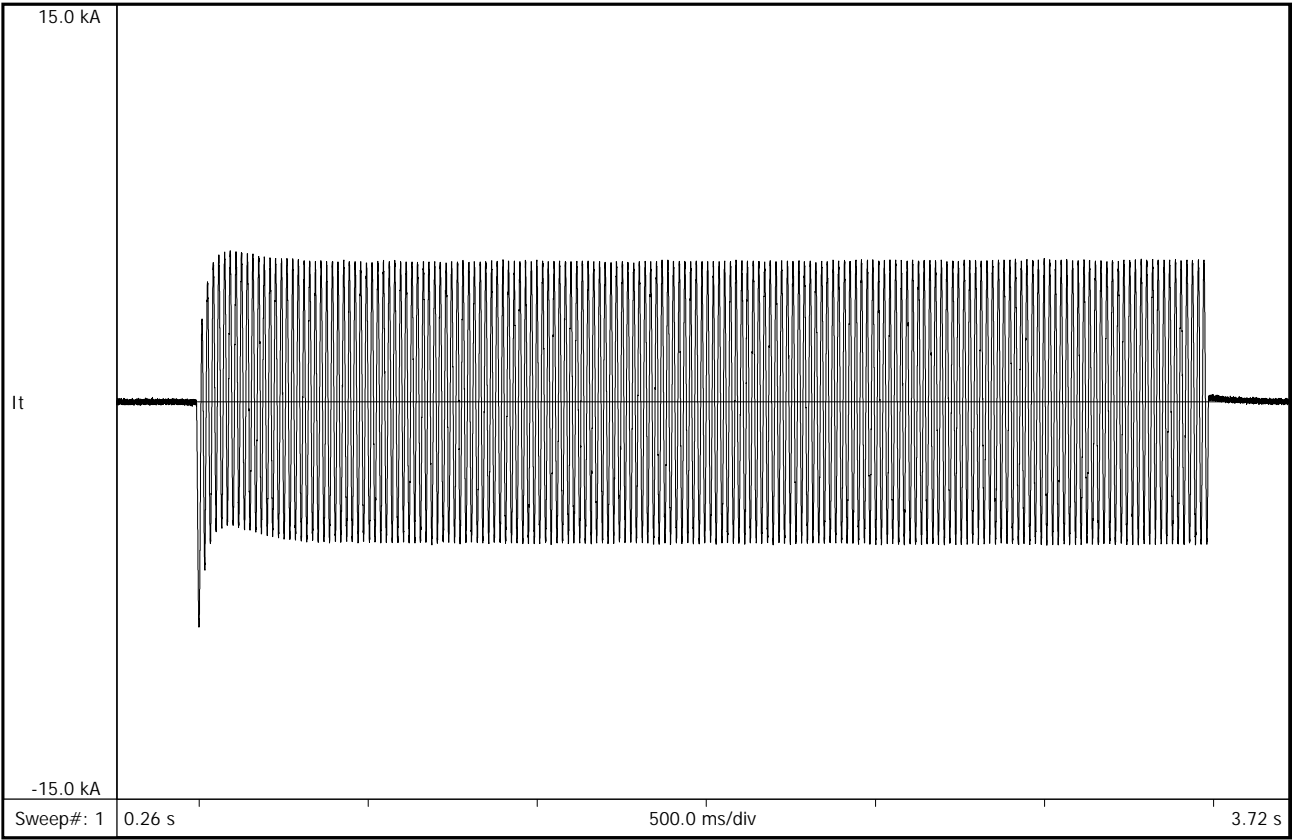
Photos

After short-time current test

Osc. HT20A2I02075-005



Osc. HT20A2I02075-006



Attachment

Photo_Test object

INFORMATION SHEET

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1. STL Type Test Certificate

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End.

