

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Circuit Breaker**

with type designation(s)

ABE, ABN, ABH, ABS, ABL, ABP, GBN, GBH & GBL

Issued to

LSIS Co., Ltd.**Cheongju-si Chungcheongbuk-do, Republic of Korea**

is found to comply with

Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

Rated Voltage (V)	460/480 (see specification)
Rated Current (A)	3 - 800
Frequency (Hz)	50 - 60

This Certificate is valid until **2019-06-30**.Issued at **Busan** on **2015-07-03**DNV GL local station: **Seoul**for **DNV GL**Approval Engineer: **Byoung So Lee**

Baeg Soon Choi
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

I MetaMec: Moulded case circuit breaker with the following data:

	ABS33b	ABH33b	ABE53b	ABS53b	ABE63b	ABS63b
Rated insulation voltage AC (V)	600/690	600/690	600/690	600/690	600/690	600/690
Rated operational voltage AC(V)	460	460	460	460	460	460
Rated Current (A)	5-30	5-30	5-50	5-50	60	5-60
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA)						
440/ 460V	5	10	5	10	5	10
415V	5	10	5	10	5	10
380V	7.5	14	7.5	14	7.5	14
220/ 240V	10	25	10	25	10	25
Rated service breaking capacity (%Icu), Ics	50	50	50	50	50	50
Rated making Capacity Icm (kA)	7.5	17	7.5	17	7.5	17
Utilization category	A	A	A	A	A	A

	ABE103b	ABE103bM	ABH53b	ABS103b	ABS103bM	ABH103b
Rated insulation voltage AC (V)	600/690	600/690	600/690	600/690	600/690	600/690
Rated operational voltage AC(V)	460	460	460	460	460	460
Rated Current (A)	5-100	32	15-50	15-100	32	15-100
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA)						
440/ 460V	10	10	25	25	25	35
415V	10	10	25	25	25	35
380V	14	14	25	25	25	35
220/ 240V	25	25	50	50	50	65
Rated service breaking capacity (%Icu), Ics	50	50	50	50	50	50
Rated making Capacity Icm (kA)	17	17	52.5	52.5	52.5	73.5
Utilization category	A	A	A	A	A	A

	ABH103b M	ABE203b	ABS203b	ABH203b	ABE403b	ABS403b
Rated insulation voltage AC (V)	600/690	600/690	600/690	600/690	600/690	600/690
Rated operational voltage AC(V)	460	460	460	460	480	480
Rated Current (A)	32	100-225	100-225	100-225	250-400	250-400
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA)						
480V	-	-	-	-	18	25
440/ 460V	35	18	25	35	25	35
415V	35	18	25	35	25	35
380V	35	18	25	35	30	42
220/ 240V	65	35	50	65	35	50
Rated service breaking capacity (%Icu), Ics	50	50	50	50	100	100
Rated making Capacity Icm (kA)	73.5	36	52.5	73.5	36	52.5
Utilization category	A	A	A	A	A	A

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	ABH403b	ABL403b	ABE803b	ABS803b	ABL803b
Rated insulation voltage AC (V)	600/690	600/690	600/690	600/690	600/690
Rated operational voltage AC(V)	480	480	480	480	480
Rated Current (A)	250-400	250-400	500-800	500-800	500-800
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA) 480V	35	65	25	45	65
440/ 460V	50	85	35	50	85
415V	50	85	35	50	85
380V	65	100	42	65	100
220/ 240V	85	125	50	100	125
Rated service breaking capacity (%Icu), Ics	50	50	100	50	50
Rated making Capacity Icm (kA)	73.5	143	52.5	94.5	143
Utilization category	A	A	A	A	A

	GBN53	GBH53	GBL53	GBN103	GBH103
Rated insulation voltage AC (V)	600/690	600/690	600/690	600/690	600/690
Rated operational voltage AC(V)	480	480	480	480	480
Rated Current (A)	16-50	16-50	16-50	16-100	16-100
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA) 480V	30	42	65	30	42
440/ 460V	35	50	85	35	50
415V	35	50	85	35	50
380V	35	50	85	35	50
220/ 240V	50	85	125	50	85
Rated service breaking capacity (%Icu), Ics	75	75	75	75	75
Rated making Capacity Icm (kA)	63	88.2	143	63	88.2
Utilization category	A	A	A	A	A

	GBL103	GBN203	GBH203	GBL203
Rated insulation voltage AC (V)	600/690	600/690	600/690	600/690
Rated operational voltage AC(V)	480	480	480	480
Rated Current (A)	16-100	16-250	16-250	16-250
Rated Frequency Hz	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA) 480V	65	30	42	65
440/ 460V	85	35	50	85
415V	85	35	50	85
380V	85	35	50	85
220/ 240V	125	50	85	125
Rated service breaking capacity (%Icu), Ics	75	75	75	75
Rated making Capacity Icm (kA)	143	63	88.2	143
Utilization category	A	A	A	A

II Metasol: Moulded case circuit breaker with the following data:

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	ABN53c	ABN63c	ABN103c	ABS33c	ABS53c	ABS63c	ABH33c
Rated insulation voltage AC (V)	750	750	750	750	750	750	750
Rated operational voltage AC(V)	460	460	460	460	460	460	460
Rated Current (A)	15-50	15-60	15-100	3-10 / 15-30	15-50	15-60	15-30
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA) 480V	-	-	-	-	-	-	-
440/ 460V	14	14	18	10 / 14	18	18	18
415V	14	14	18	10 / 14	18	18	18
380V	-	-	-	-	-	-	-
220/ 250V	30	30	35	25 / 30	35	35	35
Rated service breaking capacity (%Icu), Ics	100	100	100	100	100	100	100
Rated making Capacity Icm (kA)	28*	28*	36*	28*	36*	36*	36*
Utilization category	A	A	A	A	A	A	A

	ABS103c	ABH53c	ABH103c	ABP53c	ABP103c
Rated insulation voltage AC (V)	750	750	750	750	750
Rated operational voltage AC(V)	460	460	460	460	460
Rated Current (A)	15-125	15-50	15-125	15-50	15-125
Rated Frequency Hz	50/60	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA) 480V	-	-	-	-	-
440/	37	50	50	42	42
415V	37	50	50	42	42
380V	-	-	-	-	-
220/	85	100	100	85	85
Rated service breaking capacity (%Icu), Ics	100	100	100	100	100
Rated making Capacity Icm (kA)	77.7*	105*	105*	88.2*	88.2*
Utilization category	A	A	A	A	A

	ABN203c	ABS203c	ABP203c	ABH203c
Rated insulation voltage AC (V)	750	750	750	750
Rated operational voltage AC(V)	460	460	460	460
Rated Current (A)	100-250	100-250	100-250	100-250
Rated Frequency Hz	50/60	50/60	50/60	50/60
Rated ultimate breaking capacity Icu (kA) 480V	-	-	-	-
440/	26	37	42	50
415V	26	37	42	50
380V	-	-	-	-
220/	65	85	85	100
Rated service breaking capacity (%Icu), Ics	100	100	100	100
Rated making Capacity Icm (kA)	54.6*	77.7*	88.2*	105*
Utilization category	A	A	A	A

* Icm values is given for 440/460 V only. For other voltages pls. see technical datasheet

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Application/Limitation

Shall be installed and tested according to Det Norske Veritas' Rules for Classification of Ships, High Speed & Light Craft and Det Norske Veritas' Offshore Standards.

The manufacturer's instructions to be observed.

Suitable for use in an IT system with a capacity of 1.2 times the maximum trip current at 460 V AC (IEC 60947-2, Annex H).

Type Approval documentation

Technical info:

1-2 Summary of ratings (Ratings to be improved) (Part of documentation for DNV type approval of Metasol dated 2009-06-12).

4. MCCB Types & Ratings to be approved. (Part of documentation for DNV type approval dated 2006-08-21). "Meta-MEC Low Voltage Circuit Breakers", LSIS catalogue dated 2005-05.

Test reports / certificates:

KEMA CB TEST CERTIFICATE Nos.: NL-17236 issued 2009-11-30, NL-17241/A1 issued 2010-01-07 & NL-17244/A1 issued 2009-12-14. KEMA test reports nos.: 2030431.54 dated 2003-11-26, 2074986.50 & 2074986.50 dated 2005-02-17, 2079653.50, 2079653.51 & 2079653.52, dated 2004-12-15, 2030431.53, dated 2004-04-26, 2109959.50, 2109959.51 & 2109959.52 dated 2008-05-13.

Korea Institute of Machinery & Materials report no. 2005047320-1, issued 2005-01-31. PT&T test reports nos. R45-0138, R45-0139, R45-0140 & R45-041 issued 2005-06-22, 2109959.50, 2109959.51 & 2109959.52 dated 2008-05-13.

ERI test report nos. ERI-EN05-0073/74/75/76/77/78/79 issued 2005-06-22.

Type approval periodical assessment report issued 2015-05-18.

Tests carried out

Type tests in accordance with IEC 60947-2. Inclination-, vibration -, dry heat-, damp heat, low temperature & EMC immunity-test (conducted low frequency).

Periodical assessment

The scope of the retention/renewal survey is to verify that the conditions stipulated for the type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the survey to be dealt with:

- Ensure that type approved documentation is available.
- Ensure that materials used comply with type approved documents and/or referenced material specifications.
- Review design, materials, performance and production process with respect to possible changes, in order to ensure compliance with the type approved documentation and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and the DNV Type Approval Certificate.

Survey to be performed at least every second year.

END OF CERTIFICATE